TELEFUNKEN

SERVICE

AUDIOVISION
AUDIOVISION
AUDIOVISUEL

HiFi Videorecorder
M 960/M 9090 G/VR 6961 E/V

Bestell-Nr. 319 851 022

ACHTUNG! Ersatzteilbestellungen
sind schneller und kostengünstiger über

Btx ✻ 38100 0080 #
(Nur in der Bundesrepublik Deutschland)

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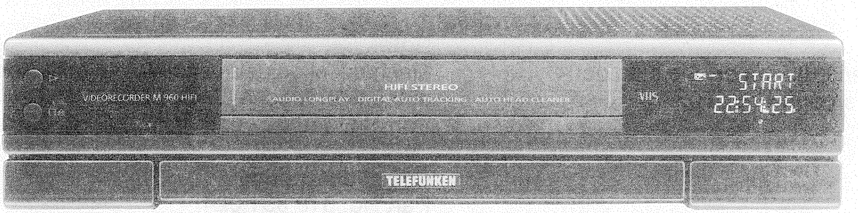
STROMLAUFPLÄNE
LAGEPLÄNE
SERVICE-HINWEISE

SCHEMATIC DIAGRAMS
COMPONENT LAYOUTS
SERVICE NOTES


VIDEORECORDER M 960 HIFI
HIFI STEREO
AUDIO LONGPLAY · DIGITAL AUTO TRACKING · AUTO HEAD CLEANER
VPS
START
22:54:25
TELEFUNKEN

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Hinweis:
Mechanische Einstellungen entnehmen Sie bitte der Service Information für das Laufwerk TT03.
Bestell-Nr. 319 851 018

Schaltungsbeschreibung:
Bestell-Nr. 319 851 024

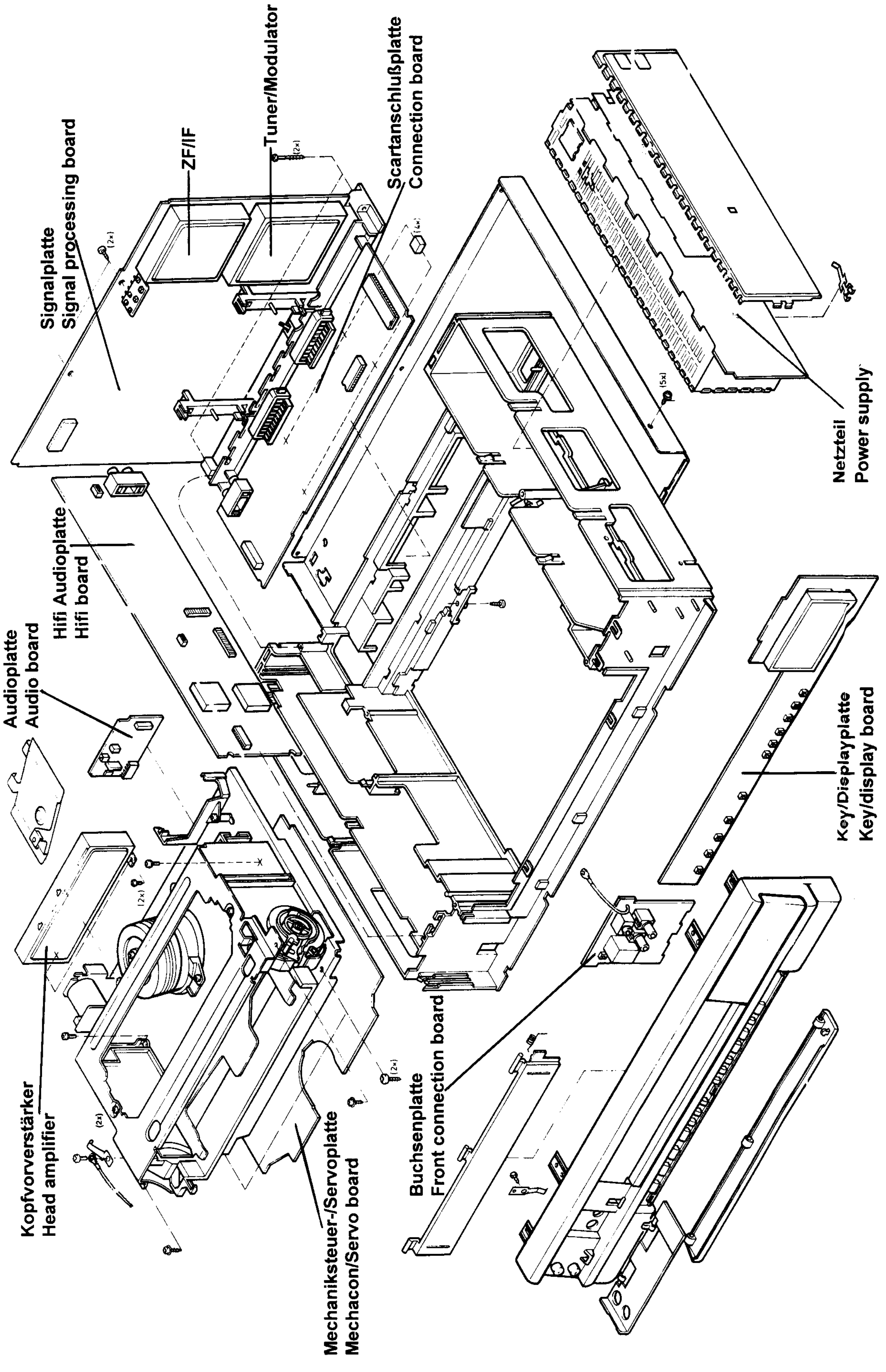
Ersatzteileliste:
Bestell-Nr. 319 851 023

Note:
Mechanical adjustments please take from the service manual for Mecha-Deck TT03.
Part No. 319 851 018

Circuit description:
Part No. 319 851 024

Spare parts list
Part No. 319 851 023

Lageplan der Leiterplatten
Circuit board location


Signalplatte
Signal processing board
ZF/IF
Tuner/Modulator
Scartanschlußplatte
Connection board
Netzteil
Power supply
Hifi Audioplatte
Hifi board
Audioplatte
Audio board
Key/Displayplatte
Key/display board
Kopfvorverstärker
Head amplifier
Mechaniksteuer-/Servoplatte
Mechacon/Servo board
Buchsenplatte
Front connection board
(2x)
(4x)
(5x)

1. Service Hinweise

1.1 Demontage des Gerätes

1.1.1 Gehäuse

a) Je 1 Schraube links und rechts vom Gehäuse herausdrehen.
b) 3 Schrauben an Gehäuserückwand herausdrehen.

1.1.2 Signalplatte (Signal-Board)

a) An der Vorderkante der Signalplatte und an der hinteren Plattenkante je 2 Schrauben links und rechts herausdrehen.
b) 2 Rastnasen vorne links und rechts von der Platte lösen und Platte in den Scharnieren nach hinten klappen.

1.1.3 Frontblende

a) 2 Schrauben an der Oberseite links und rechts vom Cassettenfach herausdrehen.
b) 4 Kunststoffzungen an der Oberseite anheben.
c) Gerät auf die Rückseite aufrecht hinstellen und 3 Kunststoffzungen an der Unterkante der Frontblende anheben und die Frontblende abnehmen.

1.1.4 Bedienfeld-Platte (Key Display Board)

a) Den unteren Stecker mit Hilfe eines Schraubendrehers abheben.
b) Das obere Kabel ist mit der Leiterplatte verlötet. Vorher Stecker von der Signal-Platte lösen.
c) 4 Rastnasen an der Oberkante der Bedienteil-Platte anheben und Platte nach oben/vorne herausheben.

1.1.5 Audio-Platte (Audio Board)

a) Flexible Leiterbahnverbindung (vom CTL-Kopf zur Audio-Platte) aus Stecker BO01 herausziehen.
b) Schraube aus schwarzer Plattenhalterung herausdrehen.
c) Leiterplatte mit Halterung nach oben aus den Verbindungsstiften der Servo-Platte herausziehen.

1.1.6 Frontbuchsenplatte (Front Connection Board)

a) Kabelstecker aus BK14 ziehen.
b) Rastnase links aufdrücken und Platte nach oben herausziehen.

1.1.7 Bodenplatte

Schraube aus der Mitte der Bodenplatte entfernen und Bodenplatte nach hinten abziehen.

1.1.8 Hifi-Audioplatte

a) Rastnase an der Geräterückseite lösen und die Hifi-Audioplatte nach oben herausziehen.

1.1.9 Scartanschlußplatte

(Ansicht von der Geräteunterseite)
a) 4 Rastnasen an der Geräterückseite lösen und die Scartanschlußplatte nach unten herausnehmen.

1.1.10 Netzteil-Platte

Es muß zuerst die Bodenplatte entfernt werden.
a) Kabel-Stecker zwischen Netzteil und Servoplatte auf Netzteil lösen.
b) Auf der linken und rechten Seite des Netzteils je 2 Rastnasen lösen und Netzteil nach oben herausziehen.
c) Abschirmung von der Unter- und Oberseite des Netzteils abziehen.
d) Um Messungen vorzunehmen, den Kabel-Stecker vom Servoteil zum Netzteil wieder aufstecken.

1. Service notes

1.1 Disassembly

1.1.1 Top cover

a) Take out one screw from the right and one from the left side.
b) Take out three screws from the rear side.

1.1.2 Signal board

a) Remove the two long screws in the signal board hinge and two screws on the front side of the signal board.
b) Disengage the two hooks; one on the left side and one on the right side. Now the board can be positioned in a up right position.

1.1.3 Front panel

a) Remove the two screws on the front left and right side of the cassette housing.
b) Bend the four top hooks of the front panel upwards to disengage them from their chassis retainers.
c) Disengage the three lower hooks of the front panel and pull the front panel forward and downward to remove.

1.1.4 Key Display Board

a) Remove lower ribben cable connector.
b) Upper cable is soldered directly to the KDB and must be disconnected from the signal board.
c) Disengage the four hooks on the upper edge of the KDB and remove the board in a forward and upward direction.

1.1.5 Audio Board

a) Disconnect the flexible cable (from CTL head to audio board) from BO01.
b) Take out the screw from the black holder.
c) Remove the audio board with holder upwards to disconnect from servo board.

1.1.6 Front connection board.

a) Disconnect the cable connector BK14.
b) Disengage one hook on the left side and remove the bord in an upward direction.

1.1.7 Bottom cover

Take out the single screw from the base and pull the bottom cover to the back to remove.

1.1.8 Hifi board

a) Disengage one hook on the rear side and take out the hifi board.

1.1.9 Connection board

(View from bottom side)
a) Disengage four hooks on the rear side and take out the connection board.

1.1.10 Power supply board

Remove the bottom cover.
a) Disconnect the cable connection to the servo board on the power supply board(BP03).
b) Disengage 2 hooks on the left and 2 hooks on the right side to take out the power supply.
c) Remove the cover from the lower and the upper side of the power supply.
d) For measurements on power board reconnect the cable connection from the servo board.

1.1.11 Cassettenschacht

a) 1 Schraube links neben Vollöschkopf lösen.
b) 1 Schraube rechts neben der Lagerung des Ausfädelarms lösen.
c) Cassettenschacht in Richtung Kopf-Trommel nach oben herausheben.

1.1.12 Servoplatte

a) Stecker von der Bedienteil-Platte abziehen.
b) Stecker vom Lademotor und Vollöschkopf abziehen.
c) 3 Schrauben aus Servo-Platte herausdrehen.
d) Steckverbindung zum Capstan- und Kopftrommelmotor lösen.
e) Servo-Platte nach unten abnehmen.

1.1.13 Laufwerk (Mecha Deck)

Voraussetzung: vorher Pkt. 1.1.9 durchführen.

a) Schraube aus der Bodenplatte herausdrehen
b) 2 große Kreuzschlitz-Schrauben links und rechts an der Vorderseite des Laufwerks herausdrehen und Laufwerk nach oben herausheben.

Anmerkung: Das Laufwerk kann auch zusammen mit der Servo-Platte ausgebaut werden.

1.2 Austausch der Kopftrommel

Hinweis:

Für einen Tausch der oberen Kopftrommel ist die Kopftrommel-Abzieh-Vorrichtung notwendig.

Wichtig:

Die Kopftrommel ist ein hochempfindliches Teil. Für Arbeiten an der Kopftrommel sollten Sie saubere und fusselfreie Baumwollhandschuhe tragen.

1.2.1 Austausch der Kopftrommel

a) Zwei Schrauben aus dem Kopftrommel-Oberteil herausdrehen.
b) Die Leiterplatte von der oberen Kopftrommel ablöten. Merken Sie sich die genaue Anschlußbelegung.
c) Zwei Gewindeschrauben der Abziehvorrichtung in die entsprechenden Gewinde der oberen Kopftrommel eindrehen.
d) Mittelachse der Abziehvorrichtung solange im Uhrzeigersinn eindrehen, bis die obere Kopftrommel komplett frei ist.
e) Nach Montage der neuen Kopftrommel die Leiterplatte montieren und verlöten.

1.1.11 Cassette housing

1) Take out the one screw near to the full erase head.
2) Take out the one screw near to the tension lever.
3) Remove the cassette housing in direction of drum and upwards.

1.1.12 Servo board

a) Remove cable connector from the KDB.
b) Remove cable connector from the full erase head and the loading motor.
c) Take out three screws from the servo board.
d) Disconnect the connectors to the capstan motor and the drum motor.
e) Pull the servo board downwards to remove.

1.1.13 Mecha Deck

a) Remove the cassette housing (ref.pt.1.1.9) and the bottom cover (ref.pt.1.1.7).
b) Take out two screws left and right on the front side of the Mecha Deck and remove it upwards.

Note: Mecha Deck can be removed together with the servo board mounted.

1.2 Exchange of upper drum

Note:

Equipment needed: Drum extractor.

Caution:

The drum is a very sensitive part. Wear clean cotton gloves!

1.2.1 Removing the head drum

a) Remove the two screws fixing the upper drum to the flywheel.
b) Unsolder the PCB from the relay pins. Carefully note the position.
c) Screw the two thin rods into the relevant holes of the upper drum.
d) Turn the press rod clockwise, till it sits on the surface of the spindle. Continue turning the press rod till the upper drum is completely free.
e) After installing the new upper drum put the PCB onto the upper drum and solder the PCB.

1.3 Service Einstellungen

1.3.1 Totale Rücksetzung

-Videorecorder vom Netz trennen.
-Tasten **Timer** und **+** gedrückt halten und dabei den Recorder am Netz anschließen.

1.3.2 Einrichten der KDB-Software

Die KDB-Software ist grundsätzlich für alle Geräte-Versionen gleich. Es ist jedoch notwendig den KDB-Prozessor über die bestehende Hardware-Konfiguration zu informieren. Dies wird bereits ab Werk konfiguriert und in den EEPROM abgelegt.

Nach jedem totalen Reset ist die KDB-Hardware-Konfiguration freigegeben. Eine neue Einrichtung (Set-Up) ist notwendig!

Nach dem totalen Reset erscheinen im Display drei Digits, deren Anzeige erhöht werden kann. Hierdurch entsteht eine Codierung des Prozessors.
1.Die **Stop**-Taste erhöht das linke Digit.
2.Die **AV**-Taste wählt das mittlere oder rechte Digit aus.
3.Die **+**-Taste erhöht das mittlere oder rechte Digit.
Nach Beendigung der Einstellprozedur die **Stop**-Taste nochmals drücken, um den Set-up-Vorgang zu beenden. (siehe Tabelle).

Nach dieser Einstellung ist der HF-Modulator-Kanal automatisch auf Kanal 60 gesetzt.

1.3 Service Adjustments

1.3.1 Total Reset

Disconnect the VTR from the mains. Hold keys **Timer** and **+** depressed and reconnect the VTR to the mains.

1.3.2 KDB Software Set-Up

The KDB software is basicly the same for all versions. Therefore it is necessary to inform the KDB processor which hardware configuration is present. This is done in the factory and the selections stored in the EEPROM.

After each total reset the KDB software Set-Up is enabled. A new configuration is necessary.

After each total reset a three digit code will be shown in the display.
1.The **STOP** key increments the first digit.
2.The **AV** key selects the second or third digit
3.The **+** key increments the second or third digit.
After selecting the last setting, press **STOP** again to finish the Software set-up procedure.

After the Software set-up procedure the antenna output channel is automatically set to CH 60 !

KDB Set-Up:

1.Digit		2.Digit		3.Digit	
1	Tuner-Norm Tuner standard	0 1 7 h	B/G sound Multistandard B/G sound DK sound I sound	0 1 2 3 4 5 6 7	B/G (Europe) Finland B/G France L Irland I Great Britain I ME/BG China/Hong Kong D Australien/New Zealand
2	Sprache language	0	abhängig von Gerätetyp. Einstellung siehe Punkt 1.3.3 **Sprachumschaltung** dependent on the VCR model. **Language selection** see point 1.3.3		
3	Servo Teil servo type	0 1 3 4 5 7	ohne / no: HiFi, Insert, Dubbing HiFi HiFi, Dubbing (Insert) (HiFi, Insert) (HiFi, Dubbing, Insert)	0 1 2 4 5 6 8 C h r	2-Kopf PAL (Video Köpfe) 3-Kopf PAL 4-Kopf PAL 2-Kopf PAL/SECAM 3-Kopf PAL/SECAM 4-Kopf PAL/SECAM 2-Kopf PAL, Longplay 4-Kopf PAL, Longplay 2-Kopf PAL/SECAM, Longplay 4-Kopf PAL/SECAM, Longplay
4	Code Sicherung Burglar mode	0	immer 0 must always be 0	0 5	ohne / no Burglar Mode mit / with Burglar Mode
5	OSD On screen display	0	immer 0 must always be 0	0 1 2 3 4	ohne / no OSD monochrome OSD RGB OSD RGB OSD mit/with Encoder Videotext

1.3.3 Sprachumschaltung

Taste **0000** an der Frontseite des Gerätes einige Sekunden lang gedrückt halten. Das Display zeigt eine neue Sprache an. Die Taste erneut drücken bis die gewünschte Sprache erscheint.

1.3.4 Änderung des HF-Modulator-Kanals

Der HF-Kanal des Modulators ist ab Werk auf den Kanal 60 eingestellt. Sollte der Kanal 60 durch einen örtlich empfangbaren Sender belegt sein, kann er in dem Bereich zwischen K 51 und K 66 per Fernbedienung eingestellt werden.

a) Grundeinstellung:

Gelbe (grüne) Taste auf der Fernbedienung für ca. 8 Sekunden gedrückt halten. Das Display zeigt nun:
"hF CH 60"
Mit den Tasten "**+**" ,"**-**" oder den Zifferntasten kann nun der gewünschte Kanal eingestellt werden.

b) Feineinstellung:

Taste "Feineinstellung" (Auto-Track) kurz drücken. Das Display zeigt einen Strich links von der Kanalnummer:
"hF -CH 60"
Mit den Tasten "**+**" oder "**-**" die Feineinstellung vornehmen.

c) Beenden:

Mit Taste "STOP" beenden Sie die Einstellungen.

1.3.5 Kopf-Trommel-Umschaltpunkt

Legen Sie eine schreibgeschützte Video-Meßkassette (Farbbalken oder Grautreppe) in den Videorecorder. Der Recorder geht automatisch in Wiedergabe. Drücken Sie am Videorecorder (nicht auf Fernbedienung!) die Tasten "**TIMER**" und "**+**" gleichzeitig. Beenden Sie die Einstellung, indem Sie die "Wiedergabe"-Taste (PLAY) drücken.
(siehe auch Punkt 2.3.7 der elektrischen Einstellungen)

1.3.6 Betrieb zweier Videorecorder mit **einer Fernbedienung**

Mit der Fernbedienung besteht die Möglichkeit zwei Videorecorder ohne gegenseitige Störung gleichzeitig bedienen zu können. Folgende Vorgehensweise ist dazu notwendig: Schalter auf der Fernbedienung (oder Batteriefach) auf Code "A" stellen.

a) **Ersten** Videorecorder vom Netz trennen und wieder verbinden. Irgendeine Taste auf der Fernbedienung betätigen. Der erste Videorecorder reagiert nur, wenn der Schalter in Stellung "A" steht.

b) Code-Schalter der Fernbedienung in die andere Position setzen (Code"B"). **Zweiten** Videorecorder vom Netz trennen und wieder verbinden. Irgendeine Taste auf der Fernbedienung betätigen. Der zweite Videorecorder reagiert nur, wenn der Schalter in Stellung "B" steht.

1.3.3 Language Selection

Press and hold the **0000** button for some seconds. The display will show a new language eg. FREN, ENGL, ITAL, ESPAN, DTSCH. The number of languages and which languages depends on the KDB software.

1.3.4 HF modulator channel setting

The modulator channel is factory preset to CH 60. If there is another broadcast on channel 60, modulator channel can be changed in the range from CH 51 to CH 66 with the remote control.

a) Modulator channel setting:

To change to another channel press the **YELLOW (GREEN)** key on the remote control for about 8 seconds.
The display shows **"hf CH 60"**
Using the **+** , **-** or **number** keys , the channel can be changed in the range from CH 51 to CH 66.

b) Fine tuning:

Press the "ADJUST" (Auto Track) -key.
The display shows a dash before the channel number.
"hf -CH 60"
Use **+** or **-** key for fine tuning.

c) Finish:

Press the **STOP** key to exit.

1.3.5 Head switching point

Insert a protected test cassette into the video recorder. Playback is set automatically. Press "**Timer**" and "**+**" key at the video recorder (not on remote control) . Press "play" key to finish the adjustment.
(see point. 2.3.7 of the electrical adjustments

1.3.6 How to control two video recorders with one remote control

With the remote control it is possible to select 2 different codes to control the video recorders.

a) On the remote control (or in the battery compartment) select code "A" for the **first** recorder. Disconnect the first recorder from the power supply, reconnect and press any key on the remote control. The recorder reacts only if position "A" of the remote control is selected.

b) Select code "B" for the **second** recorder. Disconnect the second recorder from the power supply, reconnect and press any key on the remote control. This recorder reacts only if position "B" of the remote control is selected.

1.4 Schaltfunktionen

1. Taste **HF AUSG** AUTO/MAN am Videorecorder ca. 3 Sekunden drücken. Es erscheint im Display die Anzeige "TV". Der Antennenausgang / Modulator kann jetzt mit der Taste **VCR→TV** auf der Fernbedienung manuell geschaltet werden.
Anzeige "TV" = HF-Modulator ausgeschaltet und Antennensignal durchgeschaltet.
Anzeige "VCR" = HF Modulator eingeschaltet und Antennensignal ausgeschaltet um Interferenzen zu vermeiden. Achtung: Für normalen TV Empfang ist das Antennensignal so zu schwach.
Die Taste HF AUSG erneut 3 Sekunden drücken um auf AUTO zurückzuschalten.

2. **MONITOR**-Betrieb:
Der Monitor-Betrieb erlaubt z.B. ein Satelliten-Programm im Durchschleifbetrieb zu betrachten und ein terrestrisches aufzuzeichnen.
Eingang: Decoderanschluß (Scart).
Ausgang: Audio/Videoanschluß (Scart).
Der Monitor-Betrieb kann nur aktiviert werden, wenn an Pin 8 des Decoderanschluß "H" liegt. Dies erzeugt auch ein "H" am Pin 8 vom Audio/Videoanschluß. Mit der VCR→TV Taste kann zwischen dem Decodersignal und dem Tunersignal (Programmplatz darf nicht als "Decoder aktiv" gekennzeichnet sein) umgeschaltet werden.

1.4 Switching functions

1. Press **RF OUT** AUTO/MAN button onVCR front for 3 seconds. Indicator on display lights up "TV".
Antenna output and modulator can be switched on/off manual with **VCR→TV** button on remote control .
Display indicator "TV" = Modulator switched off and antenna path switched on.
Display indicator "VCR" = Modulator switched on and antenna signal switched off to avoid interferences.
Note: In this case normal TV broadcast is too weak.
Press RF OUT button again for 3 seconds to switch to normal mode.

2. **MONITOR** mode:
Monitoring the signal from DECODER input while recording the antenna signal.
Input: DECODER (Scart)
Output: Audio/Video (Scart)
Switch over is only possible when Decoder connector pin 8 = HIGH is (coming from SAT receiver, decoder). DECODER pin 8 = HIGH forces Audio/Video connection pin 8 = HIGH.
Switch over from decoder signal to tuner signal is possible with VCR→TV button. In this case the programme number may not be set to "decoder active".

Eingangsschalter IW60/IW65
Input selector

IW60/IW65	IW15 / Pin 4	IW15 / Pin 5 IW60 / Pin 9 IW65 / Pin 9	FCB Schalter FCB Switch TW64/C	IW60 / Pin 10 IW65 / Pin 10
SCART	L	**L**	L	**L**
FRONT AV	L	**L**	H	**H**
DECODER	L	**H**	L	**L**
TUNER	H	**H**	L	**H**

TX05: In der Betriebsart DECODER wird am Kollektor von TX05 ein "H" Signal erzeugt, um einen TUNER-Befehl für das IW55 zu erhalten. IW55 schaltet in der Betriebsart DECODER die Video- und Audiosignale vom Tuner zum Decoder-Scartanschluß.

TX05: In the DECODER mode the collector of TX05 goes to "H". The collector is connected to to the control pins of IW55, so that the video and audio signals from tuner are switched to the decoder scart connector.

Ausgangsschalter IW70
Output selector

Control pin	**Pegel Level**	**Befehl Command**	**Ausgangssignal Output signal**		**an to**
10	H	Decoder	Pin 15	Decoder Audio R	Cinch out R
	L	Tu/Scart		Line Audio R	Scart out R
11	H	Decoder	Pin 14	Decoder Audio L	Cinch out L
	L	Tu/Scart		Line Audio L	Scart out L

Ausgangsschalter IW75
Output selector

Control pin	**Pegel Level**	**Befehl Command**	**Ausgangssignal Output signal**		**an to**
9	H	Decoder	Pin 4	Decod. Audio R/L	Modulator
	L	Tu/Scart		Audio Mono	
10	H	Decoder	Pin 15	Decoder Video	Modulator
	L	Tu/Scart		Video/OSD/Enc.	
11	H	Decoder	Pin 14	Decoder Video	Scart out
	L	Tu/Scart		Video/OSD	

2. Elektrische Einstellungen / Electrical Adjustments

2.1 Netzteil / Power Supply

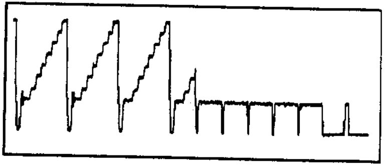
N^O:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.1.1	14 Volt Gleichspg. 14 Volts d.c. Überprüfen der Versorgungsspannungen d.c. supply voltage check	stand-by	Voltmeter	BP 04 BP 05 BP 02: pin 7/8 pin 3/4 pin 2 pin 1 BP 03: pin 7 zwischen: between: 8 und 9	PP 91 keine Einstellung möglich no adjustment possible	Bei 220 Volt Netzspannung auf 14.0 Volt einstellen. with mains voltage at 220 Volts adjust for 14.0 Volts 5,2 Volt ± 0,2 Volt 11.7 Volt ± 0,2 V 33,0 Volt ± 1,0 V -26 Volt ± 1,5 V 6,5 Volt ± 0,5 V 4,6 Volt ± 0,3 V
2.1.2	Periodendauer switching period	E-E	Oscilloscope	Anode DP91		Prüfung der Periodendauer 24 µs ±2 µs check for switching period of 24 µs ±2 µs
2.1.3	Arbeitsbereich der Betriebsspannung line voltage operating range	E-E	Voltmeter Oscilloscope			Gleiche Werte wie oben prüfen innerhalb der Spannungen 198 bis 255 Volt confirm same values as above over the entire voltage range of 198 Volts to 255 Volts

2.2 Timer/Key Display Board

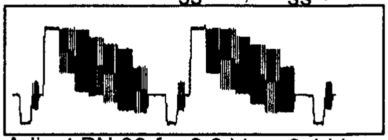
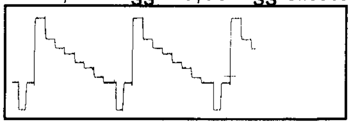
N^O:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.2.1	Taktfrequenz Clock Frequency		Frequenzzähler Frequency Counter	TP (IK01/20)	CK 03	Auf 128 ± 0.001Hz einstellen Adjust for 128 ± 0.001Hz
2.2.2	Kondensator-Spannung capacitor voltage check		Voltmeter	CK 05 1/10 Farad		Mit gezogenem Netzstecker min 4 Volt oder mehr messen confirm with the mains removed confirm 4 Volt or more

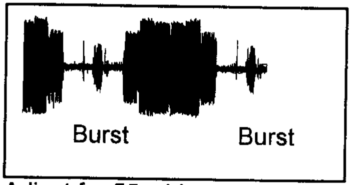
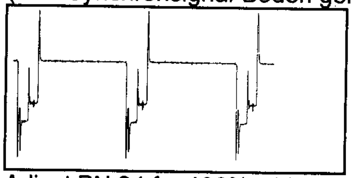
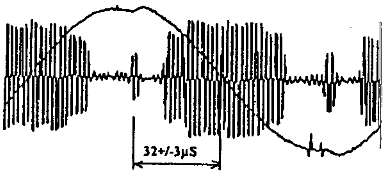
2.3 Kontrollen / Einstellungen auf der Servoplatte / Check and Adjustment on Servo Board

Anmerkung: L-Pegel < 0,8 Volt; H-Pegel > 4,0 Volt Note: low level < 0.8 V; high level > 4.0 V

N°:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.3.1	Oszillator Frequenz oscillator frequency		Frequenz-zähler Frequency counter	IT 01 pin 16		24 MHz ± 600 Hz überprüfen confirm 24 MHz ± 600 Hz
2.3.2	5 VD 5VD (Servo)		Voltmeter	BT 01 pin 4		5 V ± 0.2 V überprüfen confirm 5 V ± 0.2 V
2.3.3	Ein/Aus on /off mode		Voltmeter	TT 30 collector		Aus = 12 V oder höher Ein = 1 V oder weniger off mode = 12 Volts or higher on mode = 1 Volt or less
2.3.4	Kopftrommel-Flip-Flop Drum FF	REC/ PB	Oscilloscope	BT08 pin 7		25 Hz Signal überprüfen confirm 25 Hz signal
2.3.5	Capstan-Motor FG capstan motor FG	REC/ PB	Frequenz-zähler Frequency counter	IT 40 pin 15		PB: 750 ±30 Hz überprüfen REC: 750 ±5 Hz überprüfen PB:confirm 750 ±30 Hz REC:confirm 750 ±5 Hz
2.3.6	CTL-Signal CTL signal	PB REC PB REC	Oscilloscope	IT 40, pin11 IT 40, pin 8 IT 40, pin11 IT 40, pin8		25 Hz Signal überprüfen confirm 25 Hz signal
2.3.7	Kopf-Trommel-Umschaltpunkt Head Switching Point	PB PB	Zweistrahl-Oszilloskop; Externer Triggerpkt. BW 15 Dual-Trace Oscilloscope Trigger ext. BW 15	BW 15 BW 02 oderSCART Anschluß 19 BW 15 BW 02 or SCART, pin 19	Software-Einstellung adjustment by software setup	1. Geschützte Meßkassette einlegen 2. Spurlage optimieren 3. Tasten "**Timer**" und "**+**" drücken 4. Taste "**Wiedergabe**" drücken 5. Prüfen, ob Kopfumschaltpunkt 6,5 H ± 1 H vor dem Vertikal-Synchronimpuls liegt 1. Insert protected test cassette 2. Provide a good tracking adjustment 3. Press keys "**Timer**" and "**+**". 4. Press "**Play**" key 5. Confirm that head switching point is 6.5 H ± 1 H before vertical-sync I<--------- 6.5 H ±1H --------->I 

2.4 Signalverarbeitung-Hauptleiterplatte / Signal Processing-Signal Board

Nº:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.4.1	E-E - Pegel E-E - level	E-E Farbbalken, 1 V_{SS} E-E color bar 1 V_{pp}	Oszilloskop Oscilloscope	BW 02 oder Anschluß 19 von SCART (CIB-Platte) BW 02 or pin 19 of SCART (CIB board)	PN 39	PN 39 auf 2.0 V_{SS} ±0,1 V_{SS} einstellen  Adjust PN 39 for 2.0 V_{pp}±0,1 V_{pp}
2.4.2	FM-Modulator	E-E ohne Signal dann für Pkt. 3 100% Weiß	Frequenzähler Oszilloskop Frequenz Generator, 4,8 MHz	IN 01, Anschluß 30 zwischen CF 47/46	PN 19 (DEV) PN 21 (FO) PN 19	1. PN 19 in Mittelposition setzen 2. Mit PN 21 f = 3,85 MHz einstellen 3. Mit PN 19 auf Schwebung des Signals einstellen
	FM-Modulator	E-E without signal, then for Point 3. 100% white pattern	Frequency counter Oscilloscope Frequency Generator 4,8 MHz	IN 01, pin 30 between CF 47/46	PN 19 (DEV) PN 21 (FO) PN 19	1. Adjust PN 19 to center position 2. Adjust PN 21 for 3.85 MHz 3. Adjust PN 19 for beat frequency
2.4.3	Y- Wiedergabe-Pegel Y PB-level	PB Grautreppe PB stair-steps	Oscilloscope	BW 02 (CIB-Platte)	PN 44	Auf 2,0 $Volt_{SS}$ ± 0,08 V_{SS} einstellen  Adjust for 2.0 $Volts_{pp}$ ± 0.08 V_{pp}
2.4.4	Drop-out Pegel Drop out signal	PB Grautreppe PB stair-steps	Zweistrahl-Oszilloskop Dual trace Oscilloscope	IN 01 Pin 18 + 19 IN 01 pins 18 + 19	PF 33	1. Zweistrahl-Oszilloskop an Pin 18 und 19 von IN 01 anschließen 2. Meßcassette wiedergeben 3. Mit PF 33 gleiche Signalpegel einstellen. 1. Connect a dual trace oscilloscope to pins 18 and 19 of IN 01 2. Play back the alignment tape 3. Adjust PF 33 for equal signal levels
2.4.5	FM-Aufnahme - Pegel FM REC level	REC schwarzes Signal REC black signal	Oszilloskop Oscilloscope	TF 41, Emitter (BW16)	PF 41	1. PF 41 auf 650 mV_{SS} ± 30 mV_{SS} einstellen 1. Adjust PF 41 for 650 mV_{pp} ±30 mV_{pp}
2.4.6	4.43 MHz Farbhilfsträger 4.43 MHz VXO	PB	Frequenzzähler Frequency counter	BV 01	CV 48	Auf 4,433619 MHz ±35 Hz einstellen Adjust for 4,433619 MHz ±35 Hz

NO:	Einstellung Item	Betriebs-art Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.4.7	Farbaufnahme-Pegel Chroma REC-level	REC Farb-balken REC Color bar	Oszilloskop Oscilloscope	Emitter TV 57	PV 57	Auf 55 mV$_{ss}$ ±10 % Burstamplitude einstellen  Adjust for 55 mV$_{pp}$ ±10 % burst amplitude
2.4.8	Weißwert-Begrenzung White Clip	EE mit 100% s/w und w/s Sprung (100ns) EE with 100% b/w and w/b jump (100ns)	Oszilloskop Oscilloscope	IN 01, Pin 25	PN 24	PN 24 auf 190 % Spitzenweiß einstellen (vom Synchronsignal-Boden gemessen)  Adjust PN 24 for 190% white clip (measured from sync-bottom)
2.4.9	Modulations-grad Degree of modulation	PB	Monitor		PS 40	Meßcassette wiedergeben So einstellen, daß ein optimales Bild über HF erreicht wird. Das Bild über Scartverbindung als Vergleichsbild nehmen. (Modulationsgrad 80% negativ) Play back test cassette. Adjust to get a fine picture on the monitor via RF. Compare with the picture via scart connection. (Degree of modulation 80% negative)
Video LP Einstellungen / Video Long Play adjustments						
2.4.10	0,5 Zeilen Verzögerung für Sprung Impuls 0.5 H delayed jump pulse	ohne Signal E-E no input signal E-E	Frequenzzähler Frequency counter	IL25 Pin 20 IL25 pin 20	PL56 PL56	1.Spannungsteiler (2x100R 1%) von IL25/16 (5V) nach Pin 7(Masse) herstellen und die Mitte mit Pin21 des IL25 verbinden. 2.Auf 30 ±0,2 kHz einstellen 1.Connect a voltage divider (2x100 ohm 1%) between IL25/16 (Vcc) and pin 7(GND) and the middle to IL25 pin 21 2.Adjust for 30 ±0.2 kHz
2.4.11	BID Phase BID phase	PB Farb-balken PB color bar	Zweistrahl-Oszilloscop Dual Trace Oscilloscope	IL25 Pin 12 und 4 IL25 pin12 and pin4	FL22	Den Nulldurchgang des H/2 Signals auf 32± 3us vor der Mitte des Burst-signals stellen. Mit Signal an IL25/4 triggern. Center the burst of the PB signal between the zero crossing points of the H/2 sinus signal. Trigger with the signal from IL25 pin4. 

N°:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.4.12	Invertierter Farbpegel und Phase	PB spezial grün Testbild	Zweistrahl-Oszilloscop	IL25 Pin 10 und 12	FL46 PL39	1.Oscilloscop an die Meßpunkte anschließen. Oscilloscop auf 0,1V/div und 50ns/div stellen. 2.Meßcassette wiedergeben 3.Mit FL46 gleiche Phase und mit PL39 gleich Pegel einstellen.
	Inverted color level and phase	PB special green pattern	Dual Trace Oscilloscope	IL25 pin10 and pin12		1.Connect the dual trace oscilloscope to the test points. Set the oscilloscope to 0.1V/div and 50ns/div. 2.Play back the alignment tape 3.Adjust with FL46 for same phase and with PL39 for equal signal levels.
2.4.13	0,5 Zeilen verzögerter Video - Signalpegel	PB Grau-treppe	Zweistrahl-Oszilloscop	IL70 Pin 1 und 3	PL62	1.Oscilloscop an die Meßpunkte anschließen. 2.Meßcassette wiedergeben. 3.Mit PL62 gleiche Pegel einstellen.
	0.5 delayed video signal level	PB stairsteps	Dual Trace Oscilloscope	IL70 pin1 and pin3		1.Connect the dual trace oscilloscope to the test points. 2.Play back the alignment tape. 3.Adjust PL62 for equal signal levels.

2.5 **OSD / On Screen Display** (Scartanschußplatte / Connection board CIB)

N°:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.5.1	**OSD** Zeichen-Oszillator		Frequenzzähler	IA 40 pin 4	PA 44	Frequenzzähler über RC-Glied anschließen und mit PA 44 7,6 MHz ± 40 KHz einstellen **R = 33K, C = 1.2p**
	Character oscillator		Frequency-counter			Connect frequency-counter via RC-circuit and adjust PA 44 for 7,6 MHz ± 40 KHz
2.5.2	**OSD** Chroma-oscillator		Frequenzzähler	IA 40 pin 28	keiner	Überprüfen der 17,734475 MHz ± 500 Hz bei 25°C Umgebungstemperatur
			Frequency-counter		no	Confirm 17,734475 MHz ± 500 Hz at a surrounding temperature of 25°C
2.5.3	**OSD** Video Pegel	E-E Grau-treppe	Oscilloscope	BW 01 pin 19	keiner	Überprüfen des Ausgangspegels von 2 V_{SS} ±0,1 V_{SS}
	Video level	E-E staircase			no	Confirm output signal level of 2 V_{pp} ± 0.1 V_{pp}
2.5.4	**Encoder**		Frequenzzähler mit aktivem Tastkopf (C<1p)	IE01 Pin 27	CE07	Auf 17.734475 MHz ± 200 Hz einstellen.
			Frequency counter with active probe (C<1p)	IE01 pin 27		Adjust for 17.734475 MHz ± 200 Hz

2.6 Audio-Platte / Audio board

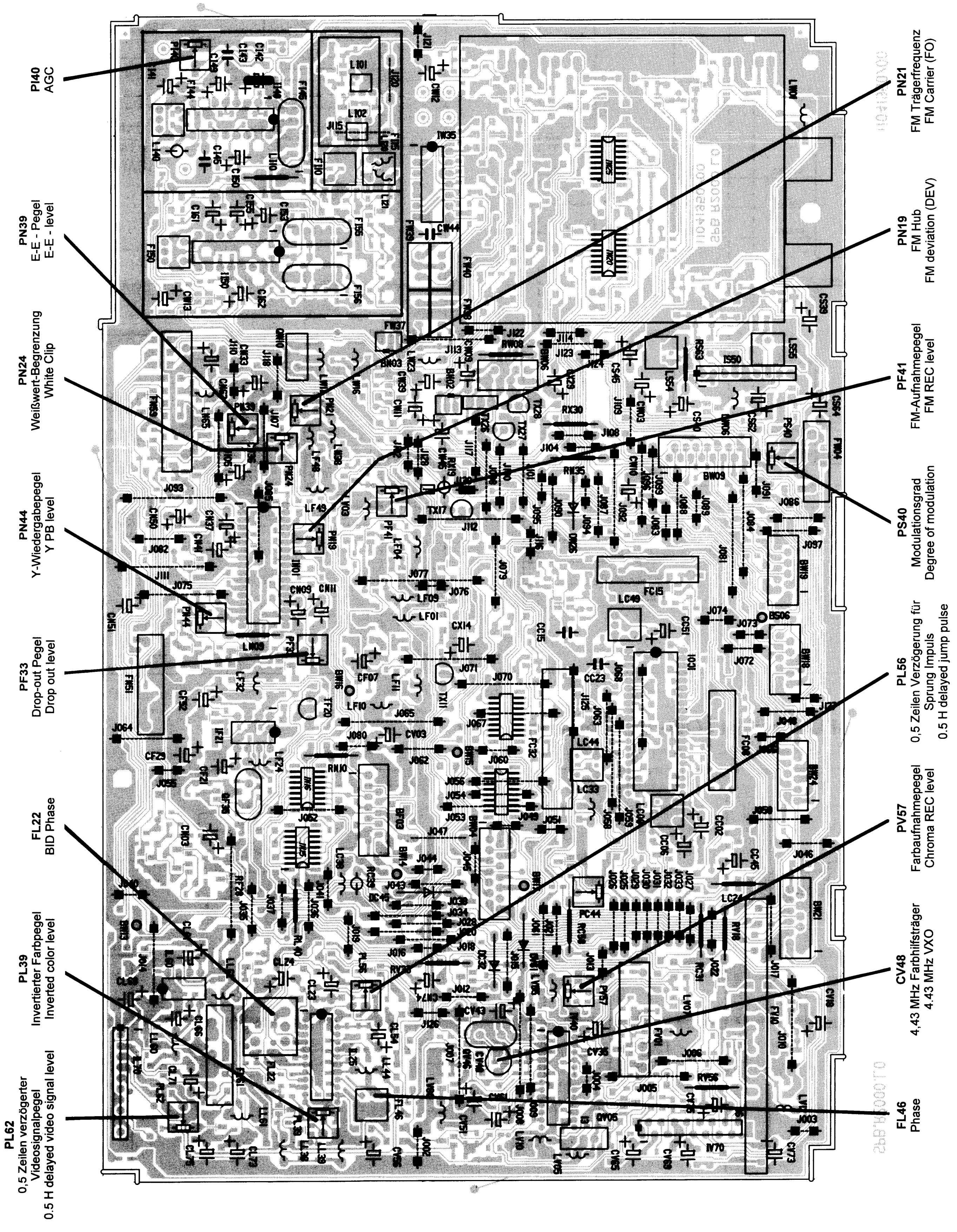
N^o:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.6.1	Audio Vormagnetisierung Audio BIAS level	REC ohne Signal REC without Signal	NF-Millivoltmeter AF millivoltmeter	BO 04 Pin 1 - 2	PO 01	Auf 3 mV ± 15% einstellen Adjust for 3 mV ± 15%
2.6.2	PB Audio-Pegel PB audio level	PB Farbbalken Meßkassette, 1KHz, 0dB PB colour bar test pattern 1KHz, 0dB	Oszilloskop Oscilloscope	SCART, Anschluß 1/3 SCART, pin 1/3	PO 13 PO 13	Auf 1,4 V_{SS} ± 0,2V_{SS} einstellen Adjust for 1,4 V_{pp} ± 0.2 V_{pp}

2.7 Hifi Audio-Platte / Hifi audio board

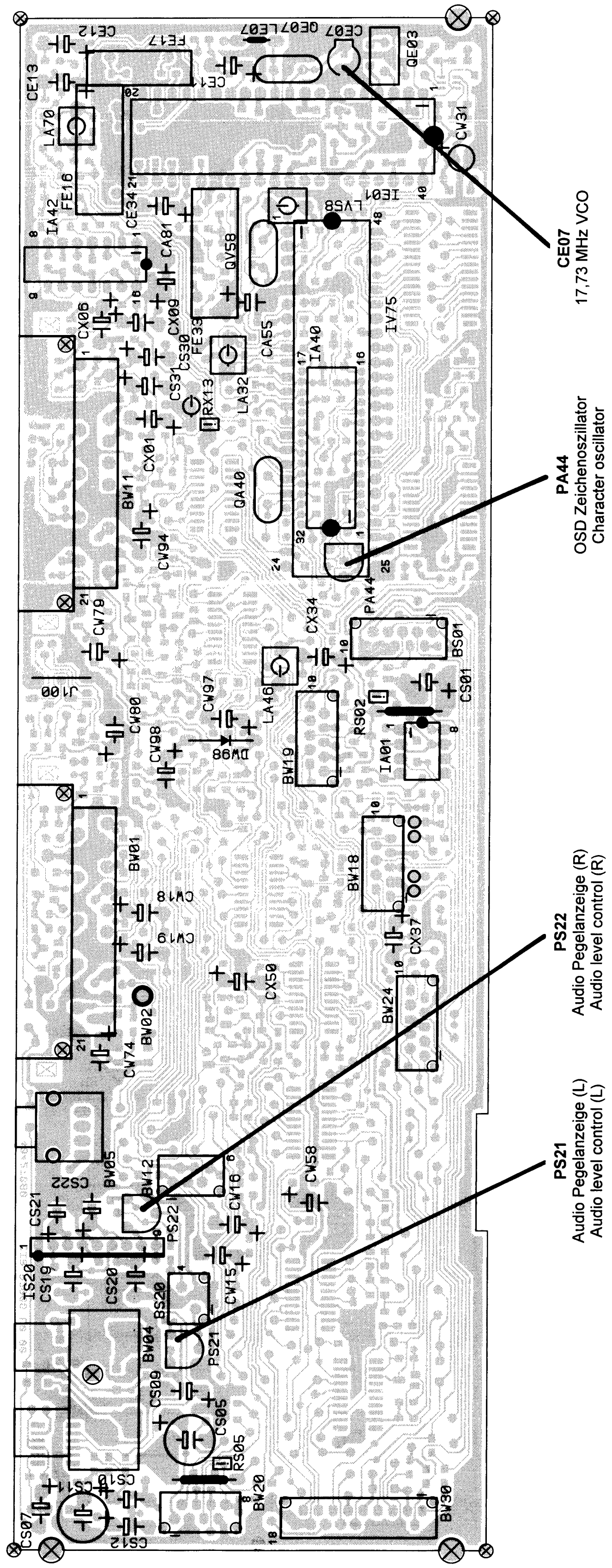
N^o:	Einstellung Item	Betriebsart Mode & Signal	Meßmittel Eingangssignal Test Equipment Input Signal	Meßpunkt Testpoint	Einstell-Punkt Adjustment Point	Beschreibung Description
2.7.1	VCO 1,4 MHz und 1,8 MHz VCO 1.4 MHz and 1.8 MHz	E-E E-E	Frequenzzähler Frequency counter	IL01 Pin 24 IL01 Pin 41	PL22 PL42 PL22 PL42	1.Auf HIFI -Eingang(CINCH) stellen ohne Eingangssignal 2.Auf 1,4 MHz ± 10kHz einstellen. 3.Auf 1,8 MHz ± 10kHz einstellen. 1.Select the cinch inputs. No input signal. 2.Adjust for 1.4 MHz ± 10 kHz. 3.Adjust for 1.8 MHz ± 10 kHz.
2.7.2	FM Hubeinstellung FM deviation	Hifi-Betrieb REC dann PB,1kHz Hifi mode REC then PB,1kHz	NF-Generator an Cinch Eing. NF-Voltmeter AF generator to cinch input AF voltmeter	Cinch OUT	PL21 (L) und PL44 (R) PL21 (L) and PL44 (R)	1.Den Eingangspegel(ca. 350mV) so einstellen, daß der Ausgangspegel 500mV beträgt. 2.Bei der Aufnahme so einstellen, daß bei Wiedergabe ein Pegel von 500mV gemessen wird. 3.Punkt 2.7.1 kontrollieren. 1.Adjust input level to approx.350mV to obtain 500mV at cinch out. 2.Adjust during record, so that the play back levels reach 500mV. 3.Check point 2.7.1
2.7.3	FM-Aufnahmestrom FM REC level	REC Hifi-Betrieb ohne Signal REC Hifi mode no signal	Oszilloscop Oscilloscope	BQ05 Pin2 (Kopfvorverstärker) BQ05 pin2 (head amplifier)	PL03	Auf 260 mV ± 15mV einstellen. Adjust for 260mV ± 15mV.

Lage der Einsteller
Adjustment positions

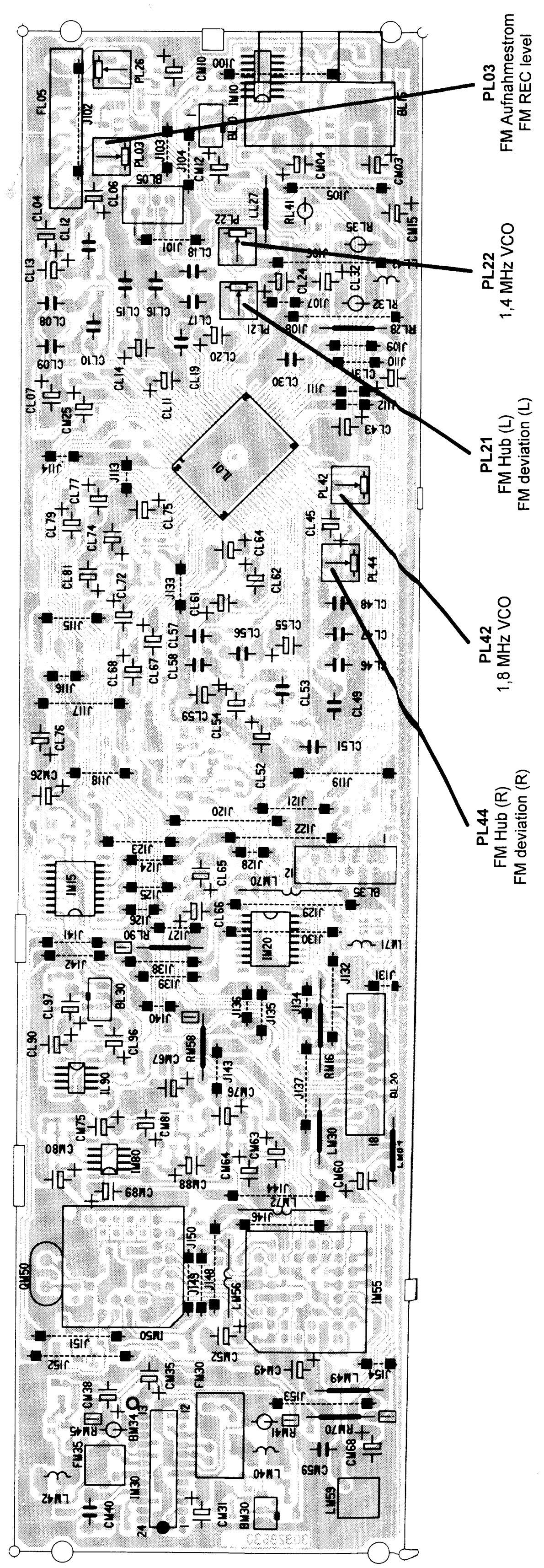
Signalplatte
Signal processing board


PI40
AGC
PN39
E-E - Pegel
E-E - level
PN24
Weißwert-Begrenzung
White Clip
PN44
Y-Wiedergabepegel
Y PB level
PF33
Drop-out Pegel
Drop out level
FL22
BID Phase
PL39
Invertierter Farbpegel
Inverted color level
PL62
0,5 Zeilen verzögerter
Videosignalpegel
0.5 H delayed video signal level
PN21
FM Trägerfrequenz
FM Carrier (FO)
PN19
FM Hub
FM deviation (DEV)
PF41
FM-Aufnahmepegel
FM REC level
PS40
Modulationsgrad
Degree of modulation
PL56
0,5 Zeilen Verzögerung für
Sprung Impuls
0.5 H delayed jump pulse
PV57
Farbaufnahmepegel
Chroma REC level
CV48
4,43 MHz Farbhilfsträger
4.43 MHz VXO
FL46
Phase

Scartanschlußplatte
Connection board

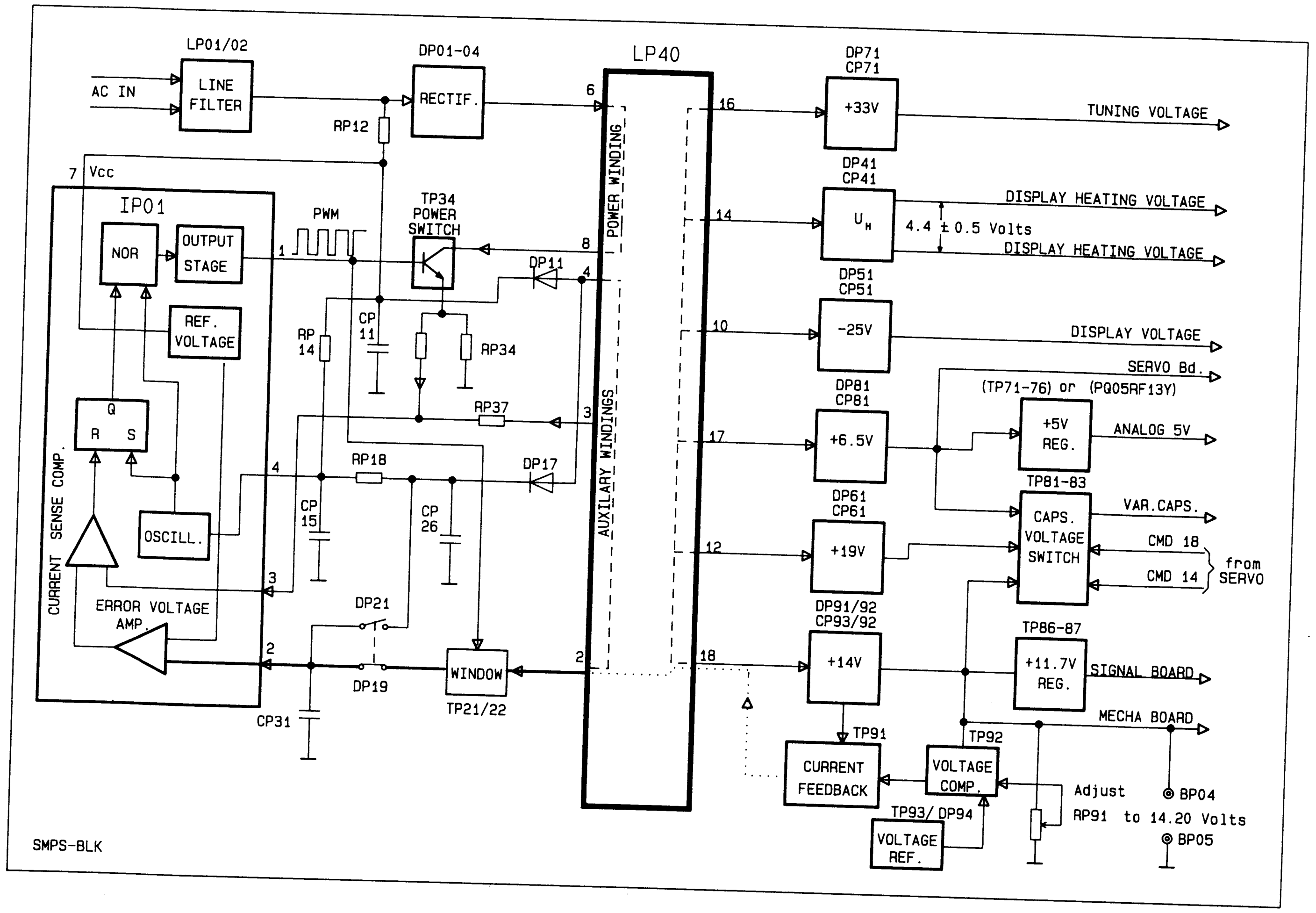

CE07
17,73 MHz VCO
PA44
OSD Zeichenoszillator
Character oscillator
PS22
Audio Pegelanzeige (R)
Audio level control (R)
PS21
Audio Pegelanzeige (L)
Audio level control (L)

HiFi-Platte
HiFi board

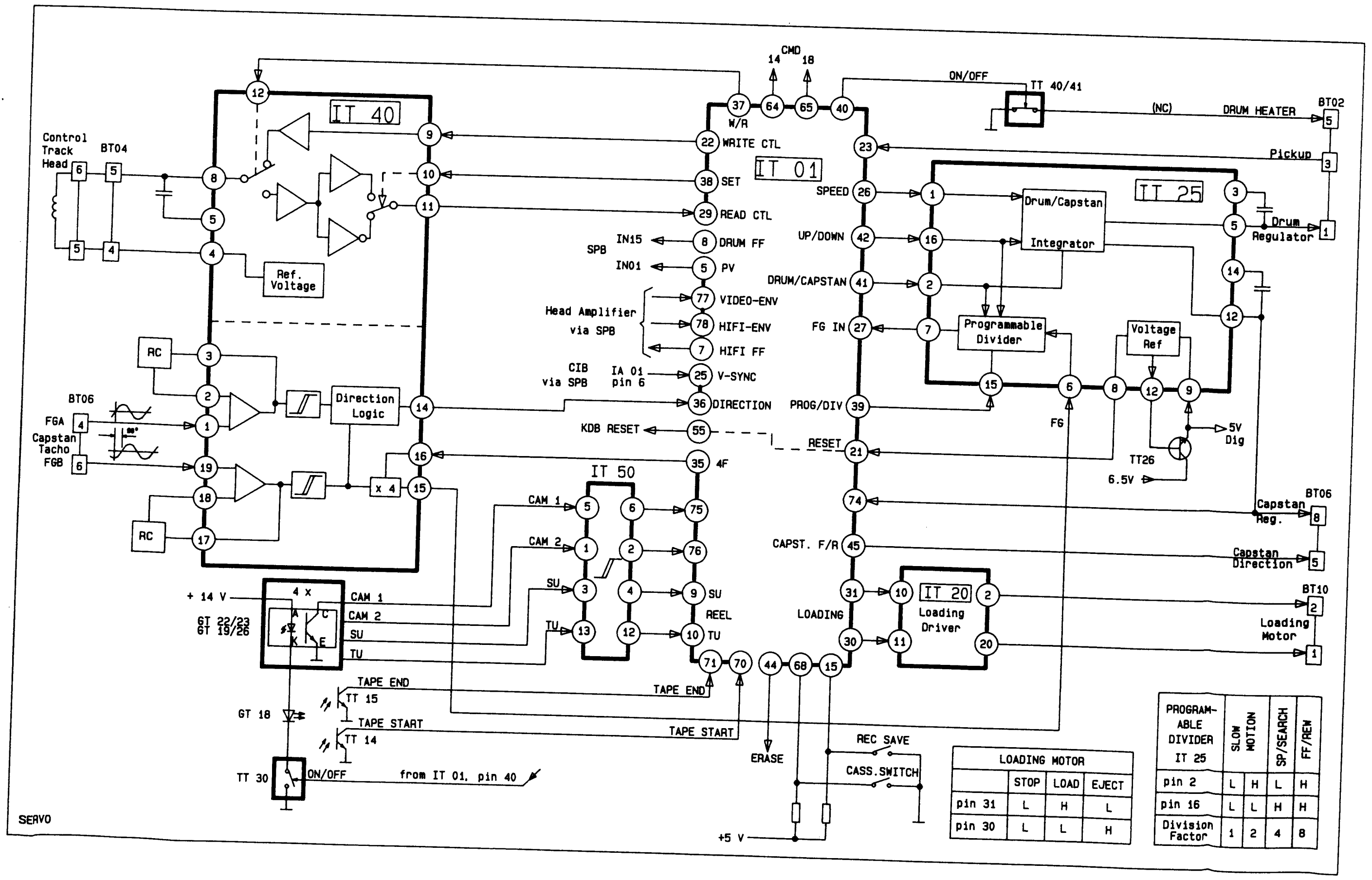

PL03
FM Aufnahmestrom
FM REC level
PL22
1,4 MHz VCO
PL21
FM Hub (L)
FM deviation (L)
PL42
1,8 MHz VCO
PL44
FM Hub (R)
FM deviation (R)

Blockschaltbilder · Block diagrams

Netzteil · Power supply


LP01/02
AC IN
LINE FILTER
DP01-04
RECTIF.
RP12
LP40
POWER WINDING
AUXILARY WINDINGS
7 Vcc
IP01
NOR
OUTPUT STAGE
REF. VOLTAGE
PWM
TP34 POWER SWITCH
DP11
CP 11
RP 14
RP34
RP37
Q
R S
OSCILL.
CURRENT SENSE COMP.
ERROR VOLTAGE AMP.
RP18
DP17
CP 15
CP 26
DP21
DP19
WINDOW
TP21/22
CP31
DP71 CP71
+33V
TUNING VOLTAGE
DP41 CP41
U_H
4.4 ± 0.5 Volts
DISPLAY HEATING VOLTAGE
DISPLAY HEATING VOLTAGE
DP51 CP51
-25V
DISPLAY VOLTAGE
SERVO Bd.
(TP71-76) or (PQ05RF13Y)
DP81 CP81
+6.5V
+5V REG.
ANALOG 5V
TP81-83
CAPS. VOLTAGE SWITCH
VAR.CAPS.
CMD 18
CMD 14
from SERVO
DP61 CP61
+19V
DP91/92 CP93/92
+14V
TP86-87
+11.7V REG.
SIGNAL BOARD
MECHA BOARD
TP91
CURRENT FEEDBACK
TP92
VOLTAGE COMP.
TP93/ DP94
VOLTAGE REF.
Adjust
RP91 to 14.20 Volts
BP04
BP05
SMPS-BLK

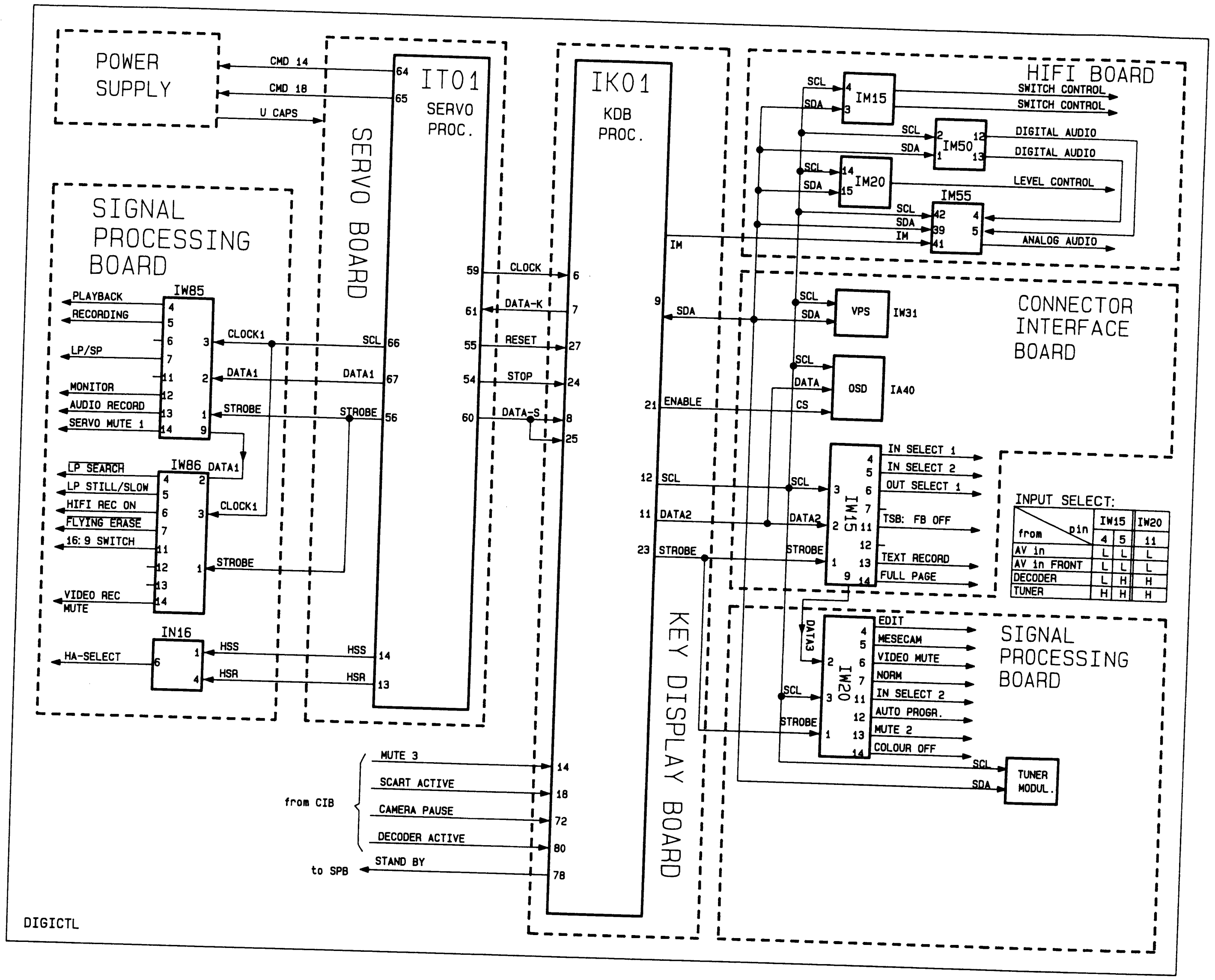
Servo · Servo


Control Track Head
BT04
IT 40
Ref. Voltage
RC
BT06
FGA
Capstan Tacho
FGB
Direction Logic
x 4
+ 14 V
GT 22/23
GT 19/26
4 x
CAM 1
CAM 2
SU
TU
GT 18
TT 15
TAPE END
TAPE START
TT 14
TT 30
ON/OFF
from IT 01, pin 40
CMD 14 18
W/R
WRITE CTL
IT 01
SET
READ CTL
IN15
DRUM FF
SPB
IN01
PV
Head Amplifier via SPB
VIDEO-ENV
HIFI-ENV
HIFI FF
CIB via SPB
IA 01 pin 6
V-SYNC
DIRECTION
KDB RESET
IT 50
4F
CAM 1
CAM 2
SU
TU
SU
REEL
TU
TAPE END
TAPE START
ERASE
REC SAVE
CASS.SWITCH
+5 V
ON/OFF
TT 40/41
(NC)
DRUM HEATER
BT02
Pickup
SPEED
UP/DOWN
DRUM/CAPSTAN
FG IN
PROG/DIV
RESET
CAPST. F/R
LOADING
IT 25
Drum/Capstan
Integrator
Programmable Divider
Voltage Ref
Drum Regulator
F6
TT26
6.5V
5V Dig
Capstan Reg.
Capstan Direction
IT 20
Loading Driver
BT10
Loading Motor
SERVO

LOADING MOTOR	STOP	LOAD	EJECT
pin 31	L	H	L
pin 30	L	L	H

PROGRAM-ABLE DIVIDER IT 25	SLOW MOTION		SP/SEARCH	FF/REW
pin 2	L	H	L	H
pin 16	L	L	H	H
Division Factor	1	2	4	8

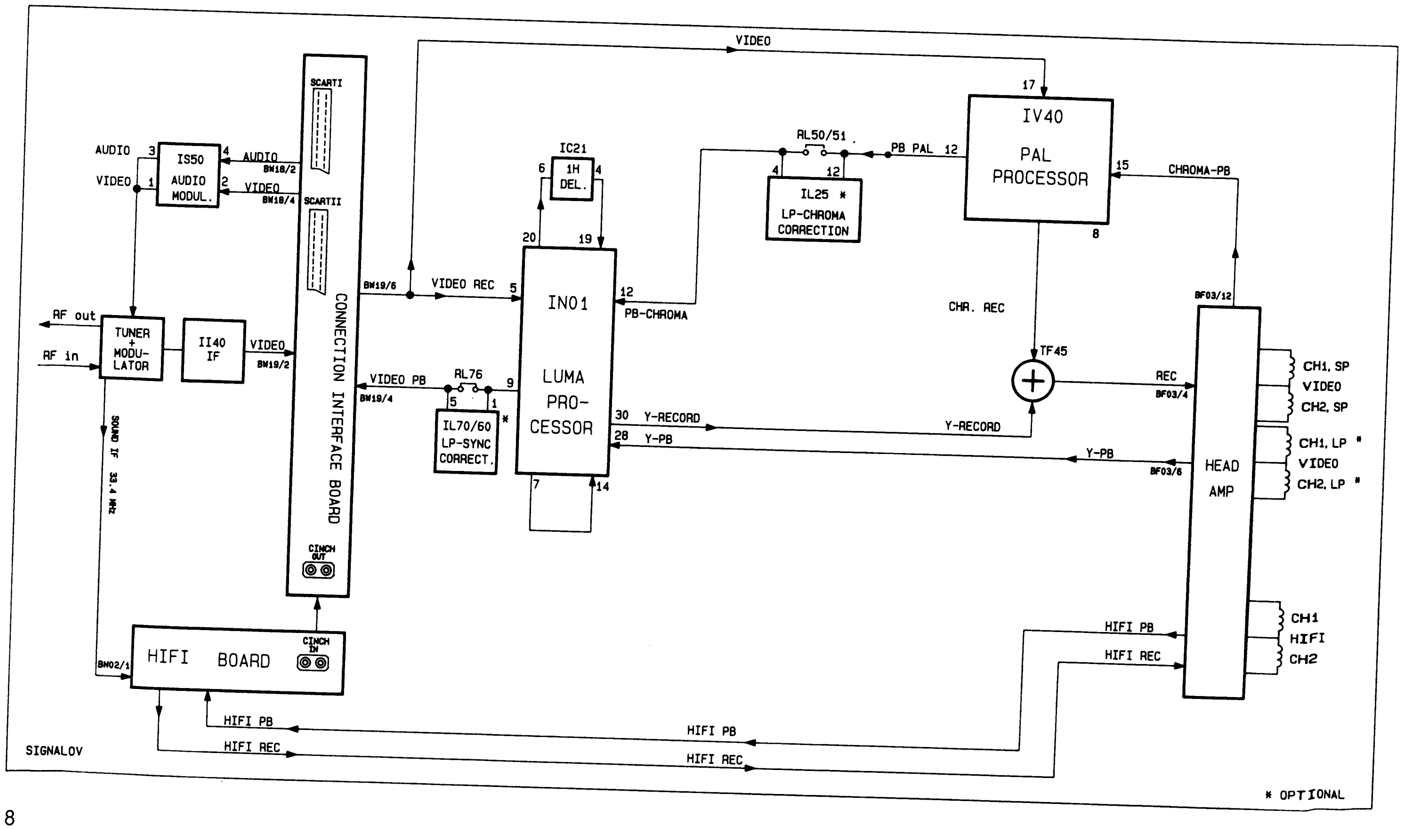
Digitalsteuerung · Digital control


POWER SUPPLY
CMD 14
CMD 18
U CAPS
IT01 SERVO PROC.
SERVO BOARD
IK01 KDB PROC.
KEY DISPLAY BOARD
SIGNAL PROCESSING BOARD
IW85
PLAYBACK
RECORDING
LP/SP
MONITOR
AUDIO RECORD
SERVO MUTE 1
CLOCK1
DATA1
STROBE
IW86
LP SEARCH
LP STILL/SLOW
HIFI REC ON
FLYING ERASE
16: 9 SWITCH
VIDEO REC MUTE
IN16
HA-SELECT
HSS
HSR
SCL
DATA1
STROBE
CLOCK
DATA-K
RESET
STOP
DATA-S
IM
SDA
ENABLE
SCL
DATA2
STROBE
MUTE 3
SCART ACTIVE
CAMERA PAUSE
DECODER ACTIVE
STAND BY
from CIB
to SPB
HIFI BOARD
IM15
SWITCH CONTROL
SWITCH CONTROL
IM50
DIGITAL AUDIO
DIGITAL AUDIO
IM20
LEVEL CONTROL
IM55
ANALOG AUDIO
CONNECTOR INTERFACE BOARD
VPS
IW31
OSD
IA40
IW15
IN SELECT 1
IN SELECT 2
OUT SELECT 1
TSB: FB OFF
TEXT RECORD
FULL PAGE
IW20
EDIT
MESECAM
VIDEO MUTE
NORM
IN SELECT 2
AUTO PROGR.
MUTE 2
COLOUR OFF
SIGNAL PROCESSING BOARD
TUNER MODUL.
DIGICTL

INPUT SELECT:

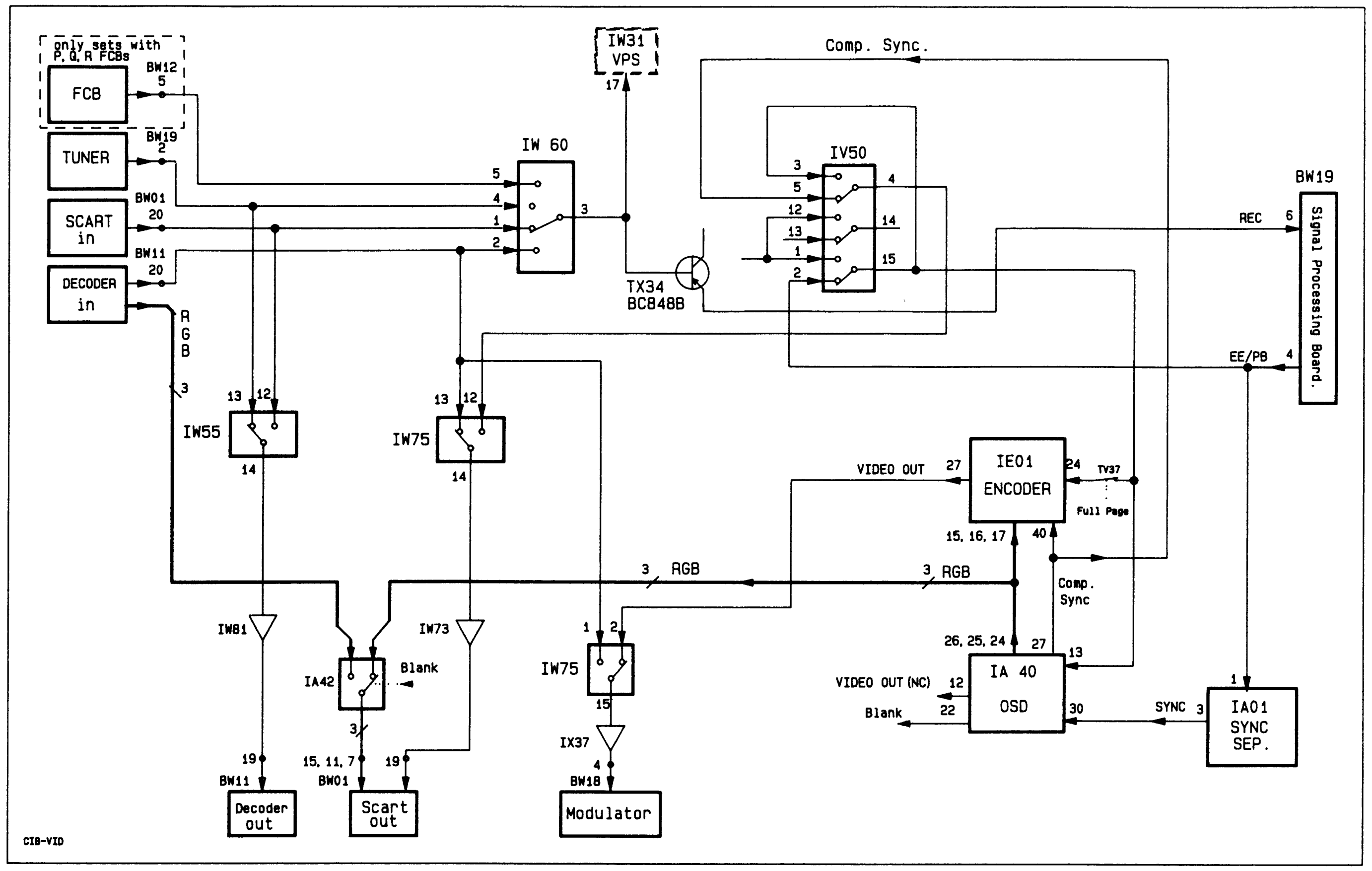
from \ pin	IW15 4	IW15 5	IW20 11
AV in	L	L	L
AV in FRONT	L	L	L
DECODER	L	H	H
TUNER	H	H	H

Signalverlauf Übersicht · Overview of signal flow

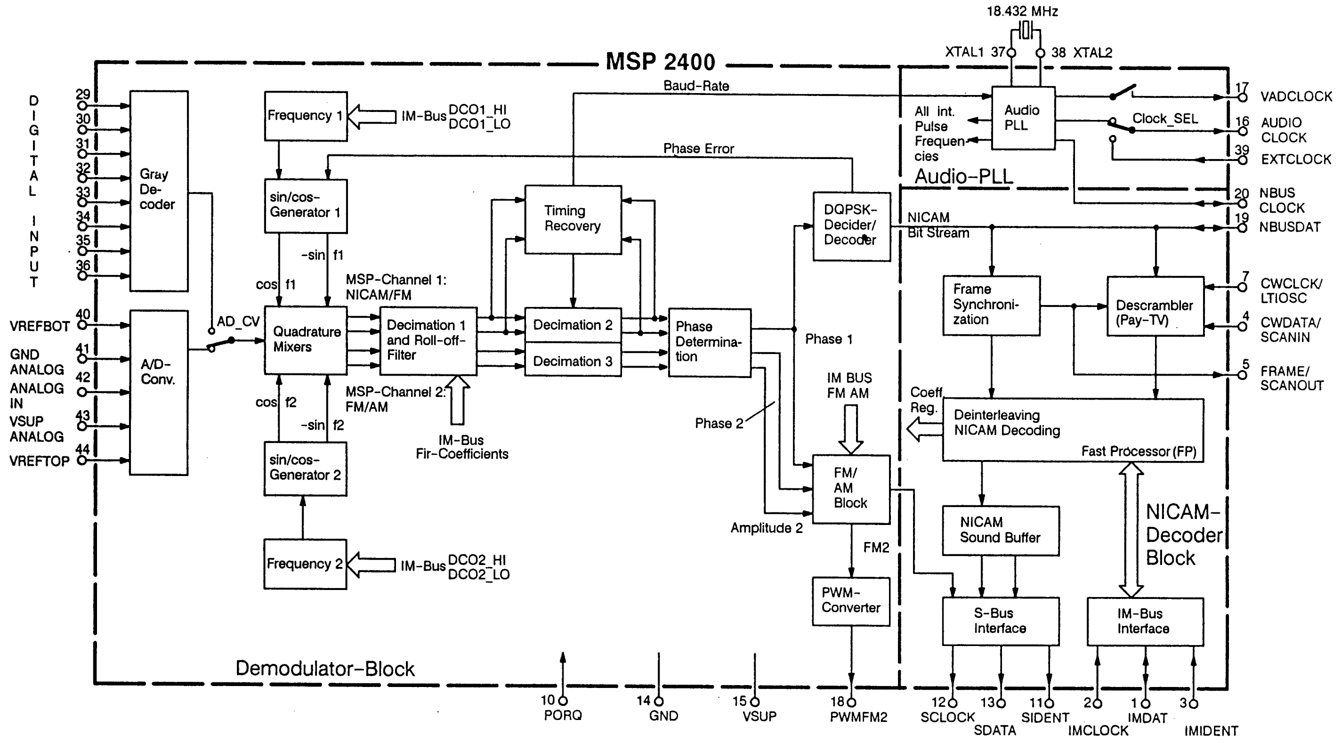

VIDEO
AUDIO
VIDEO
IS50 AUDIO MODUL.
AUDIO BM18/2
VIDEO BM18/4
SCARTI
SCARTII
CONNECTION INTERFACE BOARD
CINCH OUT
RF out
RF in
TUNER + MODU-LATOR
II40 IF
VIDEO BM19/2
SOUND IF 33.4 MHz
BM19/6
VIDEO REC
VIDEO PB
BM19/4
RL76
IL70/60 LP-SYNC CORRECT.
IC21 1H DEL.
IN01 LUMA PRO-CESSOR
PB-CHROMA
Y-RECORD
Y-PB
RL50/51
PB PAL
IL25 * LP-CHROMA CORRECTION
IV40 PAL PROCESSOR
CHROMA-PB
CHR. REC
TF45
REC BF03/4
Y-RECORD
Y-PB BF03/6
BF03/12
HEAD AMP
CH1, SP
VIDEO
CH2, SP
CH1, LP *
VIDEO
CH2, LP *
CH1
HIFI
CH2
HIFI PB
HIFI REC
HIFI BOARD
CINCH IN
BM02/1
HIFI PB
HIFI REC
HIFI PB
HIFI REC
SIGNALOV

* OPTIONAL

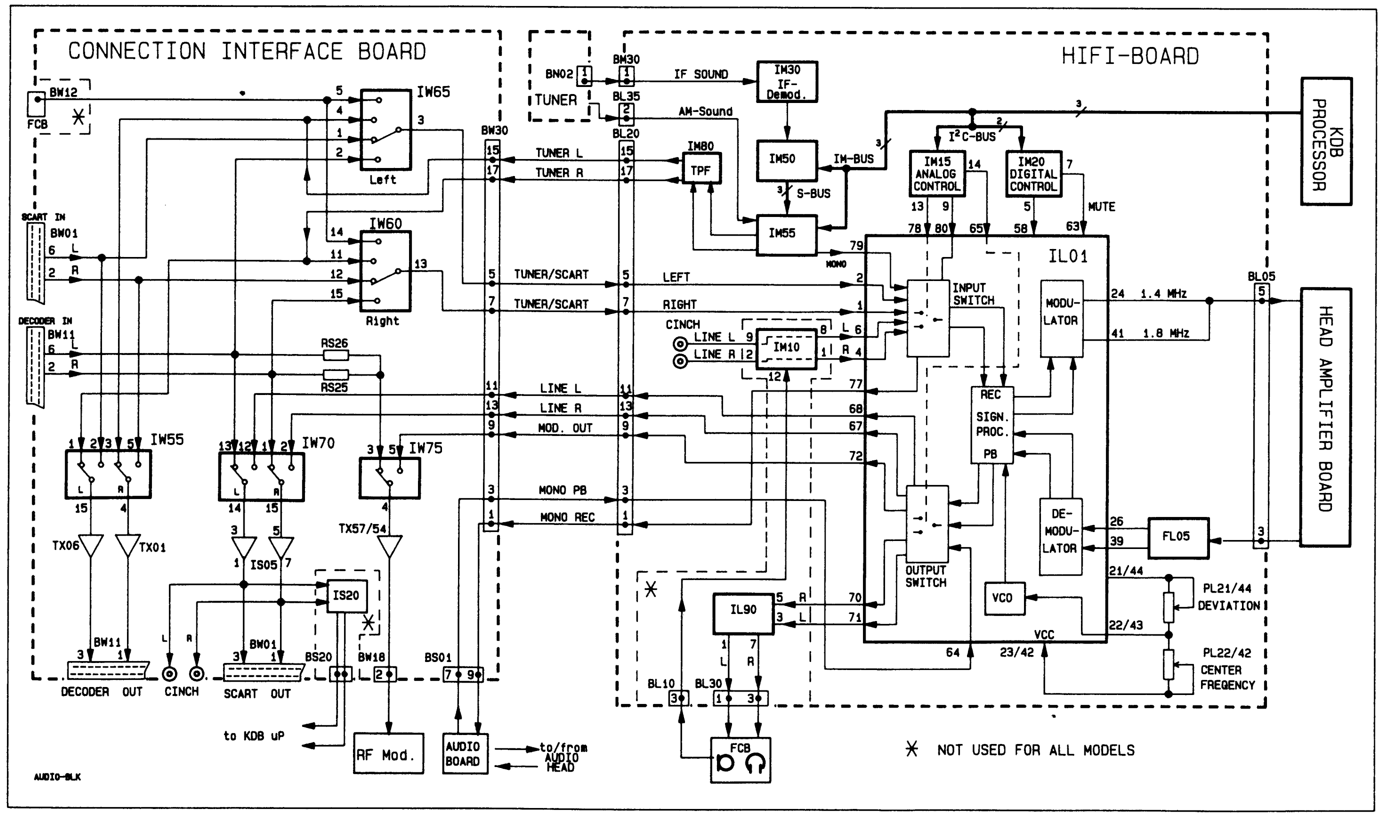
Video · Video


only sets with P, Q, R FCBs
FCB
BW12
TUNER
BW19
SCART in
BW01
DECODER in
BW11
R G B
IW 60
IV50
IW31 VPS
Comp. Sync.
TX34 BC848B
BW19
Signal Processing Board.
REC
EE/PB
IW55
IW75
IE01 ENCODER
VIDEO OUT
TV37
Full Page
3 RGB
Comp. Sync
IW81
IW73
IA42
Blank
IW75
IX37
IA 40 OSD
VIDEO OUT (NC)
Blank
SYNC
IA01 SYNC SEP.
BW11
Decoder out
BW01
Scart out
BW18
Modulator
CIB-VID

IC-MSP 2400

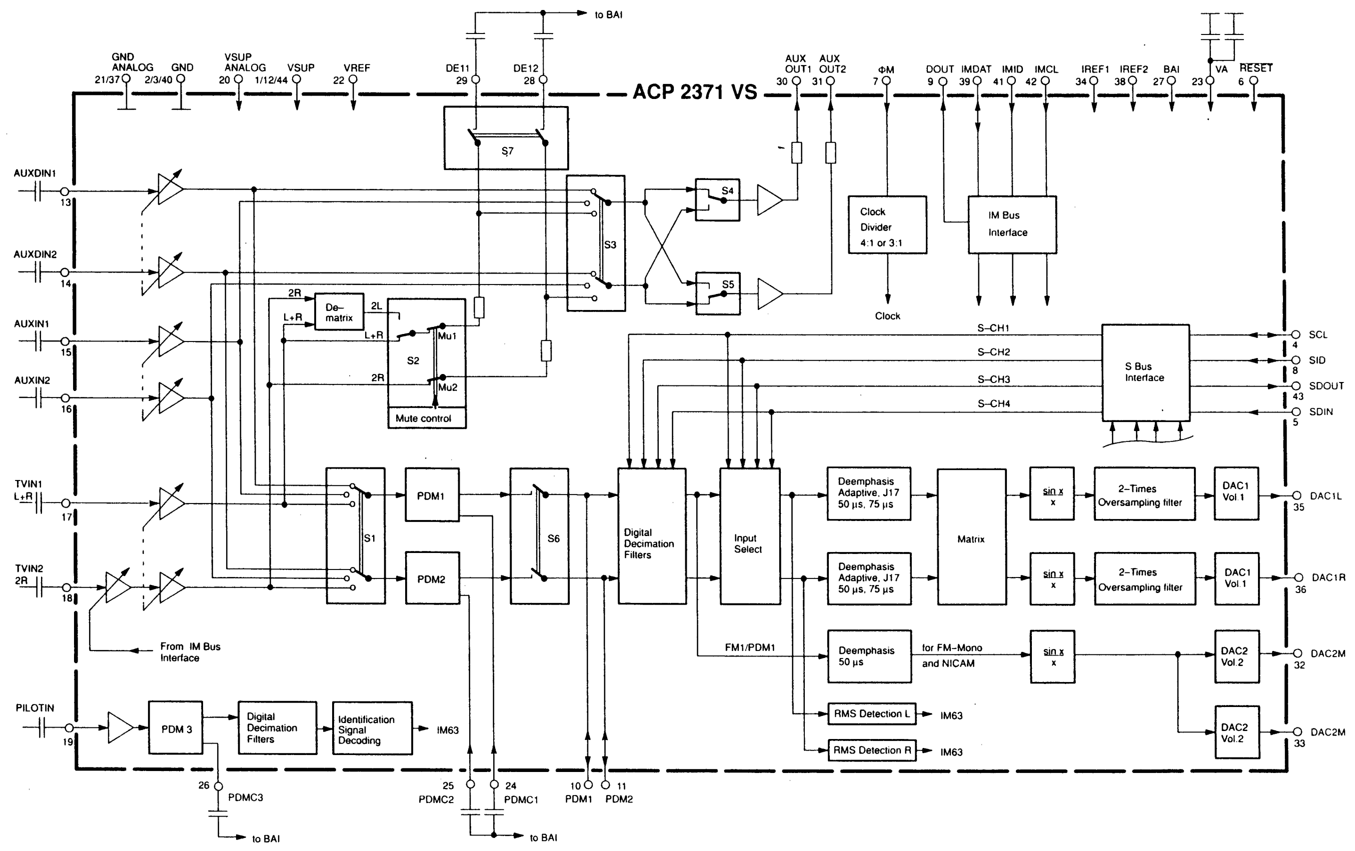

18.432 MHz
XTAL1 37
38 XTAL2
MSP 2400
DIGITAL INPUT
Gray De-coder
Frequency 1
IM-Bus DCO1_HI DCO1_LO
Baud-Rate
Phase Error
sin/cos-Generator 1
Timing Recovery
DQPSK-Decider/Decoder
All Int. Pulse Frequencies
Audio PLL
Clock_SEL
Audio-PLL
VADCLOCK
AUDIO CLOCK
EXTCLOCK
NBUS CLOCK
NBUSDAT
NICAM Bit Stream
-sin f1
cos f1
MSP-Channel 1: NICAM/FM
VREFBOT
GND ANALOG
ANALOG IN
VSUP ANALOG
VREFTOP
A/D-Conv.
AD_CV
Quadrature Mixers
Decimation 1 and Roll-off-Filter
Decimation 2
Decimation 3
Phase Determination
Phase 1
Frame Synchronization
Descrambler (Pay-TV)
CWCLCK/LTIOSC
CWDATA/SCANIN
FRAME/SCANOUT
cos f2
-sin f2
MSP-Channel 2: FM/AM
IM-Bus Fir-Coefficients
IM BUS FM AM
Phase 2
Coeff. Reg.
Deinterleaving NICAM Decoding
Fast Processor (FP)
sin/cos-Generator 2
FM/AM Block
Amplitude 2
NICAM Sound Buffer
NICAM-Decoder Block
Frequency 2
IM-Bus DCO2_HI DCO2_LO
FM2
PWM-Converter
S-Bus Interface
IM-Bus Interface
Demodulator-Block
PORQ
GND
VSUP
PWMFM2
SCLOCK
SDATA
SIDENT
IMCLOCK
IMDAT
IMIDENT

Audio · Audio


CONNECTION INTERFACE BOARD
HIFI-BOARD
BW12
FCB
IW65
Left
SCART IN
BW01
IW60
Right
DECODER IN
BW11
RS26
RS25
IW55
IW70
IW75
TX06
TX01
IS05
TX57/54
IS20
BW11
BW01
BS20
BW18
BS01
DECODER OUT
CINCH
SCART OUT
to KDB uP
RF Mod.
AUDIO BOARD
to/from AUDIO HEAD
BN02
TUNER
BW30
BM30
BL35
BL20
IF SOUND
AM-Sound
IM30 IF-Demod.
IM80 TPF
TUNER L
TUNER R
IM50
IM-BUS
S-BUS
IM55
I2C-BUS
IM15 ANALOG CONTROL
IM20 DIGITAL CONTROL
MUTE
MONO
IL01
TUNER/SCART
LEFT
RIGHT
CINCH
LINE L
LINE R
IM10
INPUT SWITCH
MODULATOR
1.4 MHz
1.8 MHz
LINE L
LINE R
MOD. OUT
REC
SIGN. PROC.
PB
MONO PB
MONO REC
DE-MODULATOR
OUTPUT SWITCH
VCO
VCC
FL05
PL21/44 DEVIATION
PL22/42 CENTER FREQENCY
IL90
BL10
BL30
FCB
BL05
KDB PROCESSOR
HEAD AMPLIFIER BOARD
AUDIO-BLK

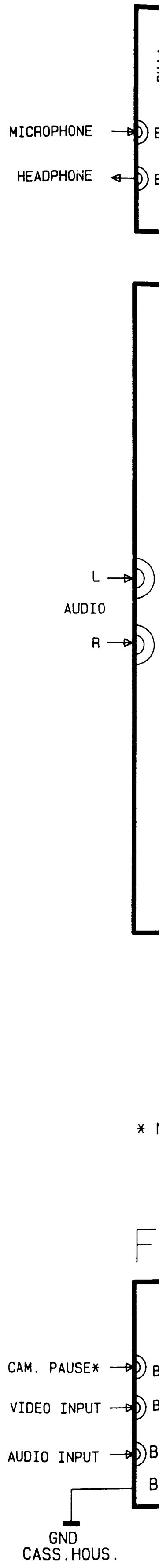
✱ NOT USED FOR ALL MODELS

IC-ACP 2371 VS


to BAI
GND ANALOG
GND
VSUP ANALOG
VSUP
VREF
DE11
DE12
AUX OUT1
AUX OUT2
ΦM
DOUT
IMDAT
IMID
IMCL
IREF1
IREF2
BAI
VA
RESET
ACP 2371 VS
S7
AUXDIN1
AUXDIN2
AUXIN1
AUXIN2
S3
S4
S5
Clock Divider 4:1 or 3:1
Clock
IM Bus Interface
De-matrix
L+R
S2
Mu1
Mu2
Mute control
S-CH1
S-CH2
S-CH3
S-CH4
S Bus Interface
SCL
SID
SDOUT
SDIN
TVIN1
TVIN2
S1
PDM1
PDM2
S6
Digital Decimation Filters
Input Select
Deemphasis Adaptive, J17 50 µs, 75 µs
Matrix
sin x / x
2-Times Oversampling filter
DAC1 Vol 1
DAC1L
DAC1R
From IM Bus Interface
FM1/PDM1
Deemphasis 50 µs
for FM-Mono and NICAM
DAC2 Vol 2
DAC2M
PILOTIN
PDM 3
Digital Decimation Filters
Identification Signal Decoding
IM63
RMS Detection L
RMS Detection R
PDMC3
PDMC2
PDMC1
PDM1
PDM2
to BAI

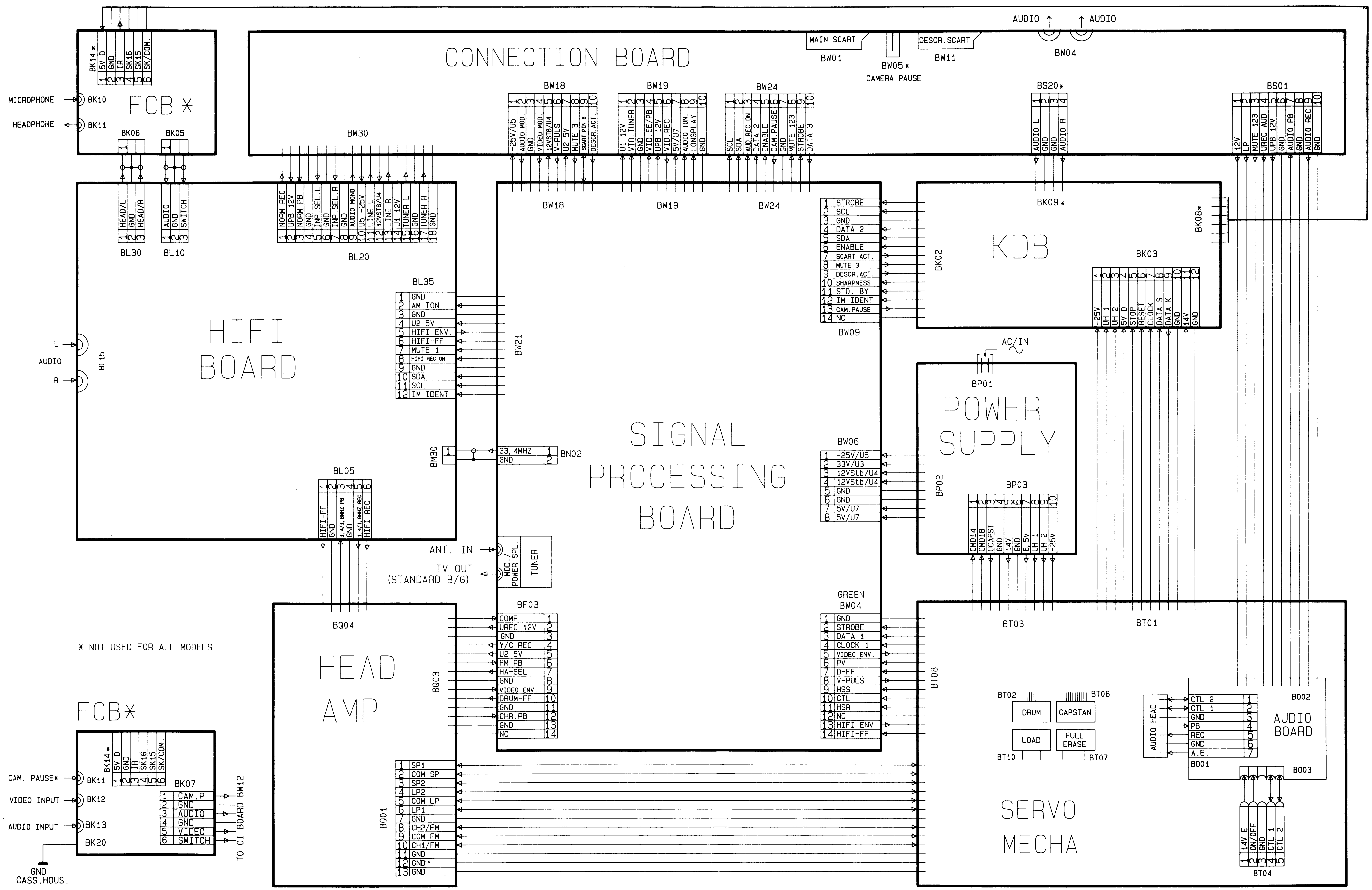
Ve

Ov


MICROPHONE
HEADPHONE
L
AUDIO
R
✱
CAM. PAUSE✱
VIDEO INPUT
AUDIO INPUT
GND CASS.HOUS.

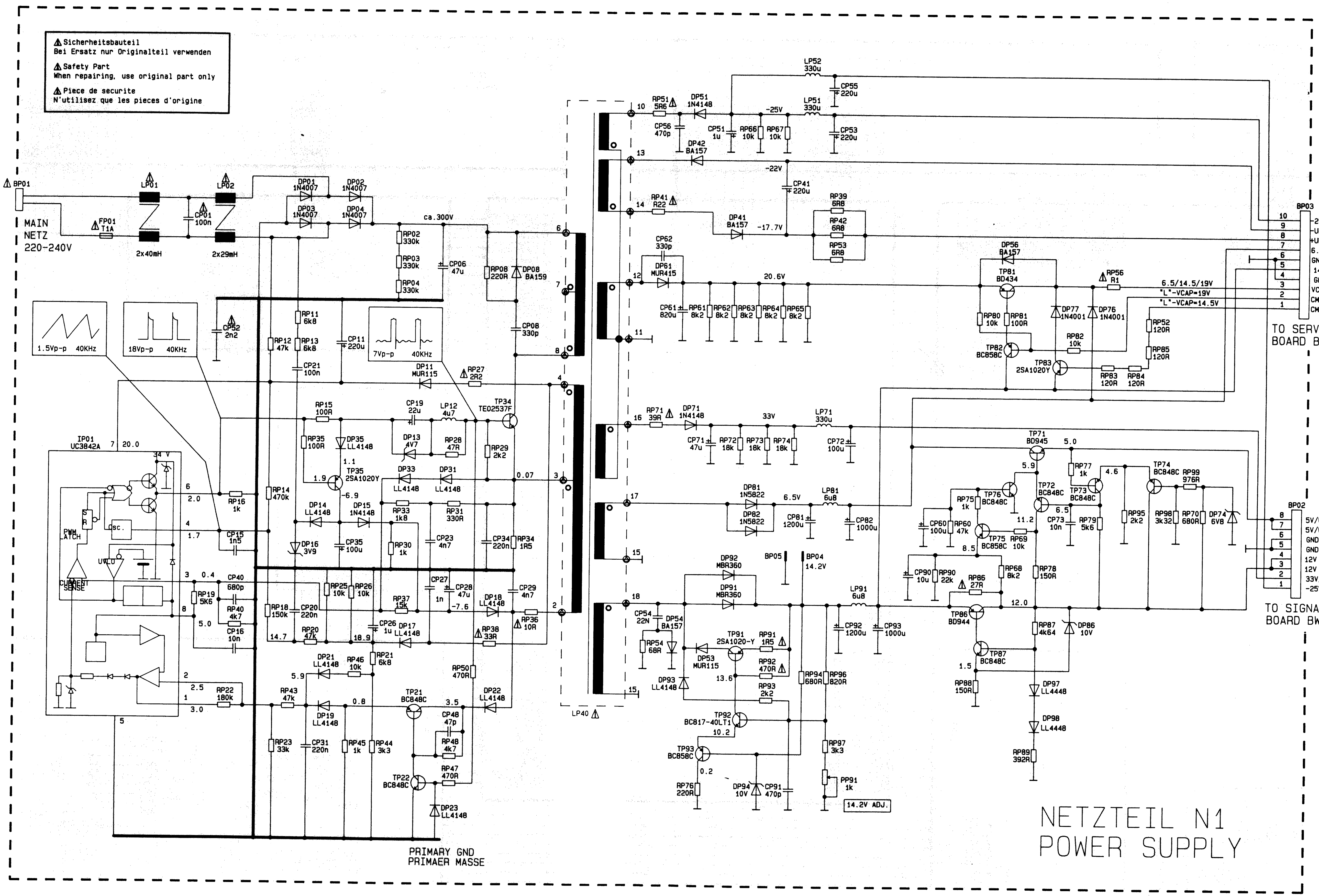
Verdrahtungsplan
Overall wiring diagram

VADCLOCK
Clock_SEL
AUDIO CLOCK
EXTCLOCK
NBUS CLOCK
NBUSDAT
Descrambler (Pay-TV)
CWCLCK/ LTIOSC
CWDATA/ SCANIN
FRAME/ SCANOUT
Processor (FP)
NICAM-Decoder Block
IM-Bus Interface
IMDAT
IMIDENT
IREF2
BAI
VA
RESET
S Bus Interface
SCL
SID
SDOUT
SDIN
2-Times Oversampling filter
DAC1 Vol 1
DAC1L
DAC1R
DAC2 Vol 2
DAC2M


CONNECTION BOARD
MAIN SCART
BW01
BW05 *
CAMERA PAUSE
DESCR.SCART
BW11
AUDIO
AUDIO
BW04
BW18
-25V/U5
AUDIO MOD.
GND
VIDEO MOD.
12VSTB/U4
V-PULS
U2 5V
MUTE 3
SCART PIN 8
DESCR.ACT.
BW19
U1 12V
VID.TUNER
GND
VID.EE/PB
UPB 12V
VID.REC
5V/U7
AUDIO TUN.
LONGPLAY
GND
BW24
SCL
SDA
AUD.REC ON
DATA 2
ENABLE
CAM.PAUSE
GND
MUTE 123
STROBE
DATA 3
BS20 *
AUDIO L
GND
GND
AUDIO R
BS01
12V
LP
MUTE 123
UREC AUD
UPB 12V
GND
AUDIO PB
GND
AUDIO REC
GND
FCB *
BK14 *
5V D
GND
IR
SK16
SK15
SK/COM.
MICROPHONE
BK10
HEADPHONE
BK11
BK06
BK05
BW30
HIFI BOARD
HEAD/L
GND
HEAD/R
AUDIO
GND
SWITCH
BL30
BL10
NORM REC
UPB 12V
NORM PB
GND
INP.SEL.L
GND
INP.SEL.R
GND
AUDIO MONO
U5 -25V
LINE L
12VSTB/U4
LINE R
U1 12V
TUNER L
GND
TUNER R
GND
BL20
BL35
GND
AM TON
GND
U2 5V
HIFI ENV.
HIFI-FF
MUTE 1
HIFI REC ON
GND
SDA
SCL
IM IDENT
L
AUDIO
R
BL15
BW21
BM30
33, 4MHZ
GND
BN02
BL05
HIFI-FF
GND
1,4/1,8MHZ PB
GND
1,4/1,8MHZ REC
HIFI REC
SIGNAL PROCESSING BOARD
BW09
STROBE
SCL
GND
DATA 2
SDA
ENABLE
SCART ACT.
MUTE 3
DESCR.ACT.
SHARPNESS
STD. BY
IM IDENT
CAM.PAUSE
NC
KDB
BK09 *
BK08 *
BK02
BK03
-25V
UH 1
UH 2
5V D
STOP
RESET
CLOCK
DATA S
DATA K
GND
14V
GND
AC/IN
BP01
POWER SUPPLY
BW06
-25V/U5
33V/U3
12VStb/U4
12VStb/U4
GND
GND
5V/U7
5V/U7
BP02
BP03
CMD14
CMD18
UCAPST
GND
14V
GND
6,5V
UH 1
UH 2
-25V
ANT. IN
TV OUT (STANDARD B/G)
MOD./ POWER SPL.
TUNER
BF03
COMP
UREC 12V
GND
Y/C REC
U2 5V
FM PB
HA-SEL
GND
VIDEO ENV.
DRUM-FF
GND
CHR.PB
GND
NC
GREEN BW04
GND
STROBE
DATA 1
CLOCK 1
VIDEO ENV.
PV
D-FF
V-PULS
HSS
CTL
HSR
NC
HIFI ENV.
HIFI-FF
HEAD AMP
BQ04
BQ03
BQ01
SP1
COM SP
SP2
LP2
COM LP
LP1
GND
CH2/FM
COM FM
CH1/FM
GND
GND
GND
SERVO MECHA
BT03
BT01
BT08
BT02
BT06
DRUM
CAPSTAN
LOAD
FULL ERASE
BT10
BT07
AUDIO HEAD
CTL 2
CTL 1
GND
PB
REC
GND
A.E.
B001
B002
AUDIO BOARD
B003
14V E
UN/OFF
GND
CTL 1
CTL 2
BT04
FCB*
BK14 *
5V D
GND
IR
SK16
SK15
SK/COM.
CAM. PAUSE*
BK11
VIDEO INPUT
BK12
AUDIO INPUT
BK13
BK20
GND CASS.HOUS.
BK07
CAM.P
GND
AUDIO
GND
VIDEO
SWITCH
TO CI BOARD BW12

* NOT USED FOR ALL MODELS

Netzteil N1
Power supply



⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden
⚠ Safety Part
When repairing, use original part only
⚠ Piece de securite
N'utilisez que les pieces d'origine
BP01
MAIN
NETZ
220-240V
FP01 T1A
LP01
LP02
2x40mH
2x29mH
CP01 100n
CP52 2n2
DP01 1N4007
DP02 1N4007
DP03 1N4007
DP04 1N4007
ca.300V
RP02 330k
RP03 330k
RP04 330k
CP06 47u
RP08 220R
DP08 BA159
CP08 330p
1.5Vp-p 40KHz
18Vp-p 40KHz
7Vp-p 40KHz
RP11 6k8
RP12 47k
RP13 6k8
CP11 220u
CP21 100n
DP11 MUR115
RP27 2R2
RP15 100R
CP19 22u
LP12 4u7
TP34 TE02537F
RP35 100R
DP35 LL4148
DP13 4V7
RP28 47R
RP29 2k2
TP35 2SA1020Y
DP33 LL4148
DP31 LL4148
0.07
IP01 UC3842A
20.0
34 V
PWM LATCH
OSC.
UVLO
CURRENT SENSE
RP16 1k
CP15 1n5
RP14 470k
DP14 LL4148
DP15 1N4148
RP33 1k8
RP31 330R
CP23 4n7
CP34 220n
RP34 1R5
DP16 3V9
CP35 100u
RP30 1k
CP40 680p
RP19 5K6
RP40 4k7
CP16 10n
RP18 150k
CP20 220n
RP20 47k
RP25 10k
RP26 10k
RP37 15k
CP27 1n
CP28 47u
DP18 LL4148
CP29 4n7
RP36 10R
CP26 1u
DP17 LL4148
RP38 33R
-7.6
DP21 LL4148
RP46 10k
RP21 6k8
RP50 470R
RP22 180k
RP43 47k
DP19 LL4148
TP21 BC848C
DP22 LL4148
CP48 47p
RP48 4k7
RP23 33k
CP31 220n
RP45 1k
RP44 3k3
RP47 470R
TP22 BC848C
DP23 LL4148
PRIMARY GND
PRIMAER MASSE
LP40 ⚠
RP51 5R6
DP51 1N4148
CP56 470p
DP42 BA157
CP51 1u
RP66 10k
RP67 10k
-25V
LP52 330u
LP51 330u
CP55 220u
CP53 220u
-22V
CP41 220u
RP41 R22
DP41 BA157
-17.7V
RP39 6R8
RP42 6R8
RP53 6R8
CP62 330p
DP61 MUR415
20.6V
CP61 820u
RP61 8k2
RP62 8k2
RP63 8k2
RP64 8k2
RP65 8k2
DP56 BA157
TP81 BD434
RP56 R1
DP77 1N4001
DP76 1N4001
RP80 10k
RP81 100R
RP82 10k
TP82 BC858C
TP83 2SA1020Y
RP83 120R
RP84 120R
RP52 120R
RP85 120R
6.5/14.5/19V
"L"-VCAP=19V
"L"-VCAP=14.5V
BP03
-25V
-Uh1
+Uh2
6.5V
GND
14V
GND
VCAPST
CMD18
CMD14
TO SERVO
BOARD BT03
RP71 39R
DP71 1N4148
33V
LP71 330u
CP71 47u
RP72 18k
RP73 18k
RP74 18k
CP72 100u
TP71 BD945
5.0
RP77 1k
TP74 BC848C
RP99 976R
DP81 1N5822
DP82 1N5822
6.5V
LP81 6u8
CP81 1200u
CP82 1000u
RP75 1k
TP76 BC848C
TP72 BC848C
TP73 BC848C
CP60 100u
RP60 47k
TP75 BC858C
RP69 10k
CP73 10n
RP79 5k6
RP95 2k2
RP98 3k32
RP70 680R
DP74 6V8
BP02
5V/U7
5V/U7
GND
GND
12V STB/U4
12V STB/U4
33V/U3
-25V/U5
TO SIGNAL
BOARD BW06
DP92 MBR360
DP91 MBR360
BP05
BP04 14.2V
CP54 22N
DP54 BA157
RP54 68R
DP53 MUR115
TP91 2SA1020-Y
RP91 1R5
RP92 470R
RP93 2k2
DP93 LL4148
TP92 BC817-40LT1
TP93 BC858C
RP76 220R
DP94 10V
CP91 470p
LP91 6u8
CP92 1200u
CP93 1000u
RP94 680R
RP96 820R
RP97 3k3
PP91 1k
14.2V ADJ.
CP90 10u
RP90 22k
RP86 27R
RP68 8k2
RP78 150R
12.0
TP86 BD944
RP87 4k64
DP86 10V
TP87 BC848C
RP88 150R
DP97 LL4448
DP98 LL4448
RP89 392R
NETZTEIL N1
POWER SUPPLY

Wichtiger Hinweis!

Service-Arbeiten am SM-Netzteil nur über Regeltrenntrafo durchführen.
Alle Spannungen und Oszillogramme auf der Primärseite des Netzteils gegen Primärmasse messen!

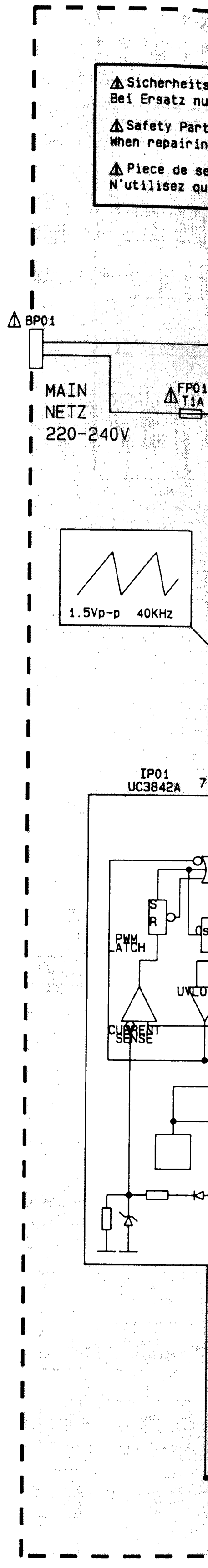
Wenn nicht anders angegeben, sind die Gleichspannungen und Oszillogramme im STOP-Betrieb gemessen.

Important note!

Repairs on SM line section are to be carried out only with isolating transformer.
Measure all voltages and oscillograms on the primary side of the line section against primary line section ground!

If not otherwise noted, all DC-voltages and oscillograms are measured during STOP mode.

Netzteil P1
Power suppl



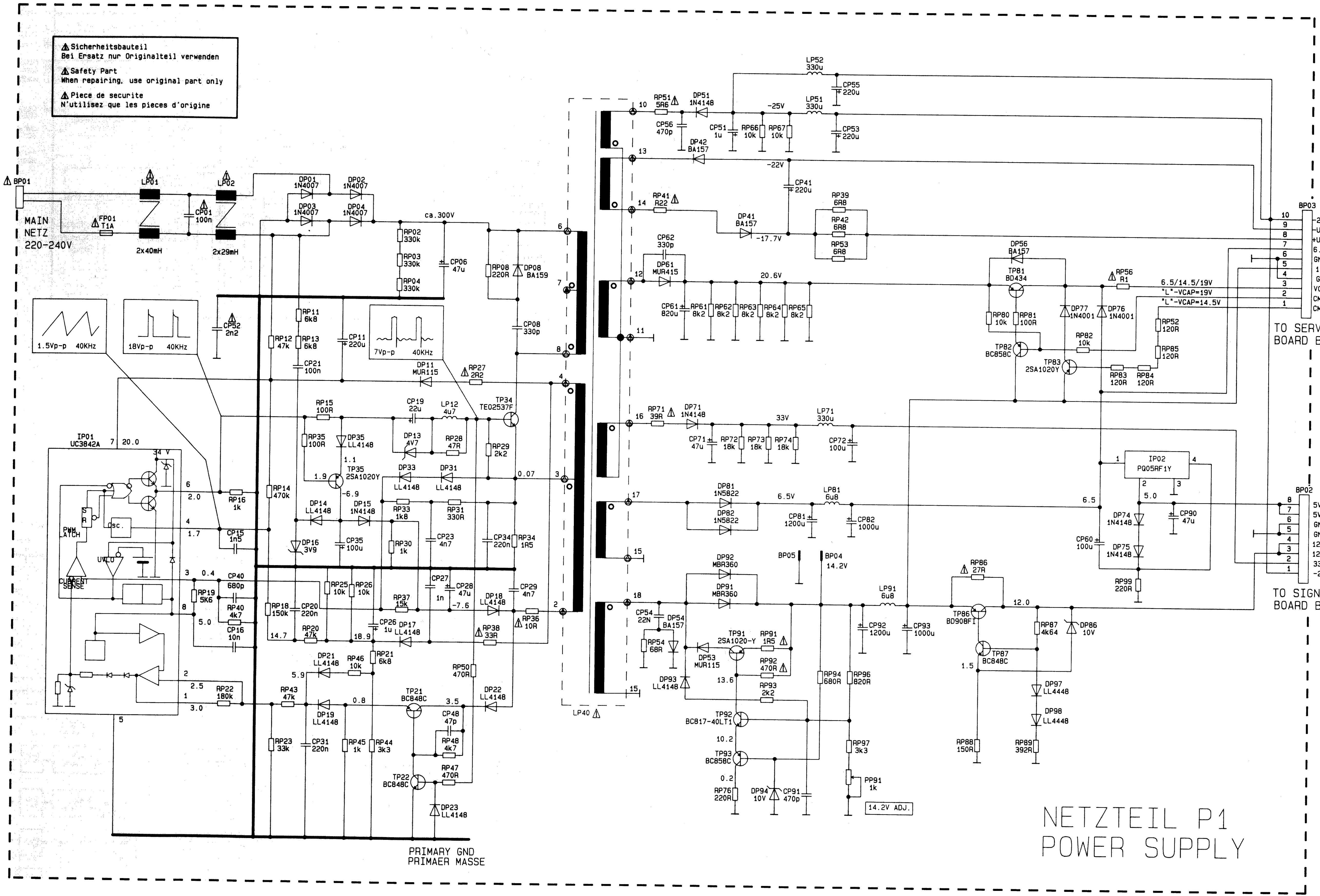
⚠ Sicherheits
Bei Ersatz nu
⚠ Safety Part
When repairin
⚠ Piece de se
N'utilisez qu
BP01
MAIN
NETZ
220-240V
FP01 T1A
1.5Vp-p 40KHz
IP01 UC3842A
PWM LATCH
CURRENT SENSE

Wichtiger Hinwei

Service-Arbeiten an
Alle Spannungen un

Wenn nicht anders a
gemessen.

Netzteil P1
Power supply



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⚠ Safety Part
When repairing, use original part only

⚠ Piece de securite
N'utilisez que les pieces d'origine

BP01
MAIN
NETZ
220-240V
FP01
T1A
LP01
2x40mH
CP01
100n
LP02
2x29mH
DP01 1N4007
DP02 1N4007
DP03 1N4007
DP04 1N4007
ca. 300V
RP02 330k
RP03 330k
RP04 330k
CP06 47u
RP08 220R
DP08 BA159
CP08 330p
CP52 2n2
1.5Vp-p 40KHz
18Vp-p 40KHz
7Vp-p 40KHz
RP11 6k8
RP12 47k
RP13 6k8
CP11 220u
CP21 100n
DP11 MUR115
RP27 2R2
RP15 100R
CP19 22u
LP12 4u7
TP34 TE02537F
RP35 100R
DP35 LL4148
DP13 4V7
RP28 47R
RP29 2k2
TP35 2SA1020Y
1.1
1.9
-6.9
DP33 LL4148
DP31 LL4148
0.07
RP14 470k
DP14 LL4148
DP15 1N4148
RP33 1k8
RP31 330R
DP16 3V9
CP35 100u
RP30 1k
CP23 4n7
CP34 220n
RP34 1R5
IP01 UC3842A
20.0
34 V
PWM LATCH
OSC.
UVLO
CURRENT SENSE
2.0
1.7
0.4
5.0
2.5
3.0
RP16 1k
CP15 1n5
CP40 680p
RP19 5K6
RP40 4k7
CP16 10n
RP22 180k
RP18 150k
CP20 220n
RP20 47k
14.7
18.9
RP25 10k
RP26 10k
RP37 15k
CP27 1n
CP28 47u
-7.6
DP18 LL4148
CP29 4n7
RP36 10R
CP26 1u
DP17 LL4148
RP38 33R
DP21 LL4148
RP46 10k
RP21 6k8
5.9
RP43 47k
0.8
DP19 LL4148
TP21 BC848C
3.5
CP48 47p
RP48 4k7
RP47 470R
RP50 470R
DP22 LL4148
RP23 33k
CP31 220n
RP45 1k
RP44 3k3
TP22 BC848C
DP23 LL4148
PRIMARY GND
PRIMAER MASSE
LP40 ⚠
RP51 5R6
DP51 1N4148
CP56 470p
CP51 1u
RP66 10k
RP67 10k
-25V
LP52 330u
CP55 220u
LP51 330u
CP53 220u
DP42 BA157
-22V
CP41 220u
RP41 R22
DP41 BA157
-17.7V
RP39 6R8
RP42 6R8
RP53 6R8
CP62 330p
DP61 MUR415
20.6V
CP61 820u
RP61 8k2
RP62 8k2
RP63 8k2
RP64 8k2
RP65 8k2
RP71 39R
DP71 1N4148
33V
LP71 330u
CP71 47u
RP72 18k
RP73 18k
RP74 18k
CP72 100u
DP81 1N5822
DP82 1N5822
6.5V
LP81 6u8
CP81 1200u
CP82 1000u
BP05
BP04
14.2V
DP92 MBR360
DP91 MBR360
LP91 6u8
CP54 22N
DP54 BA157
RP54 68R
TP91 2SA1020-Y
RP91 1R5
DP53 MUR115
RP92 470R
DP93 LL4148
13.6
RP93 2k2
CP92 1200u
CP93 1000u
RP94 680R
RP96 820R
TP92 BC817-40LT1
10.2
TP93 BC858C
0.2
RP76 220R
DP94 10V
CP91 470p
RP97 3k3
PP91 1k
14.2V ADJ.
DP56 BA157
TP81 BD434
RP56 R1
6.5/14.5/19V
"L"-VCAP=19V
"L"-VCAP=14.5V
RP80 10k
RP81 100R
DP77 1N4001
DP76 1N4001
RP82 10k
TP82 BC858C
TP83 2SA1020Y
RP83 120R
RP84 120R
RP52 120R
RP85 120R
IP02 PQ05RF1Y
6.5
5.0
CP90 47u
DP74 1N4148
DP75 1N4148
CP60 100u
RP86 27R
RP99 220R
TP86 BD908FI
12.0
RP87 4k64
DP86 10V
TP87 BC848C
1.5
DP97 LL4448
DP98 LL4448
RP88 150R
RP89 392R
BP03
-25V
Uh1
+Uh2
6.5V
GND
14V
GND
VCAPST
CMD18
CMD14
TO SERVO BOARD BT03
BP02
5V/U7
5V/U7
GND
GND
12V STB/U4
12V STB/U4
33V/U3
-25V/U5
TO SIGNAL BOARD BW06
NETZTEIL P1
POWER SUPPLY

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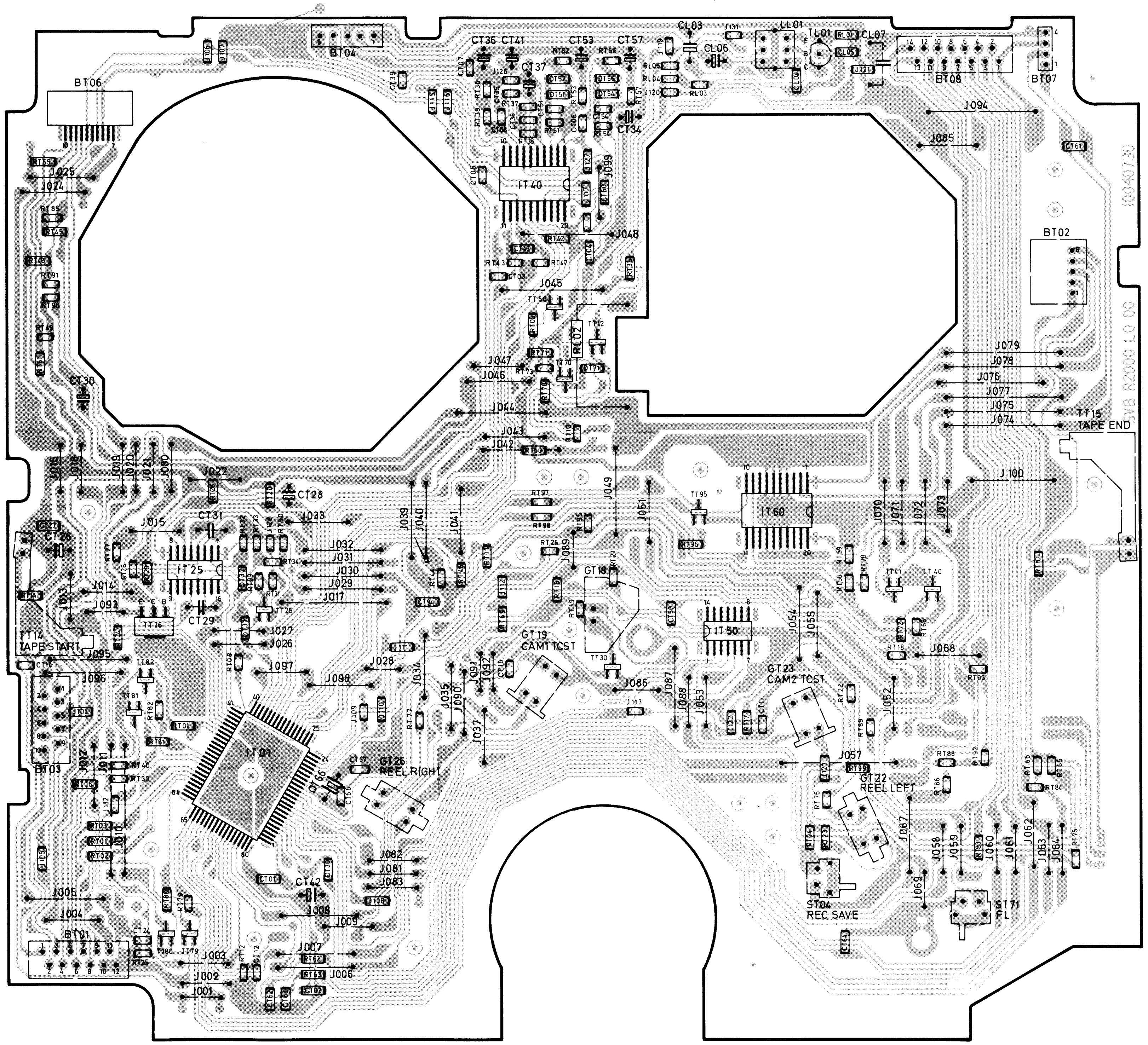
Service-Arbeiten am SM-Netzteil nur über Regeltrenntrafo durchführen.
Alle Spannungen und Oszillogramme auf der Primärseite des Netzteils gegen Primärmasse messen!

Wenn nicht anders angegeben, sind die Gleichspannungen und Oszillogramme im STOP-Betrieb gemessen.

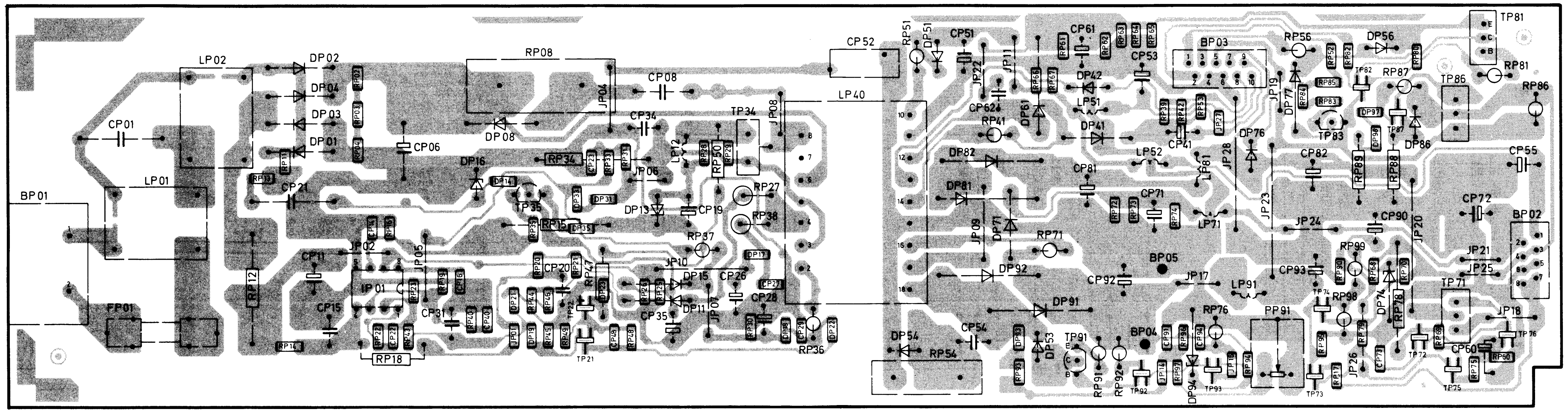
Important note!
Repairs on SM line section are to be carried out only with isolating transformer.
Measure all voltages and oscillograms on the primary side of the line section against primary line section ground!

If not otherwise noted, all DC-voltages and oscillograms are measured during STOP mode.

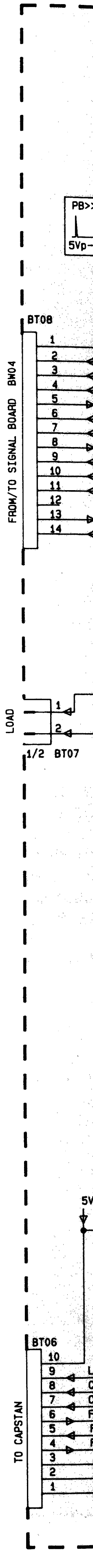
Servoplatte
Servo board


BT06
BT04
CT36
CT41
CT53
CT57
CL03
LL01
TL01
CL07
CL06
BT08
BT07
CT37
CT34
IT40
J048
J045
J094
J085
BT02
J079
J078
J076
J077
J075
J074
TT15
TAPE END
J100
J025
J024
CT30
J047
J046
J044
J043
J042
J016
J018
J019
J020
J021
J080
J022
CT28
CT31
J015
J033
CT26
IT25
J032
J031
J030
J029
J017
J014
J093
TT26
CT29
J027
J026
TT14
TAPE START
J095
J096
J097
J098
J028
J039
J040
J041
J049
J051
IT60
J070
J071
J072
J073
GT18
GT19
CAM1 TCST
IT50
J054
J055
J068
GT23
CAM2 TCST
J086
J087
J088
J053
J052
BT03
IT01
GT26
REEL RIGHT
J057
GT22
REEL LEFT
J012
J011
J010
J034
J035
J090
J091
J092
J037
J082
J081
J083
CT42
J008
J009
J005
J004
BT01
J003
J002
J001
J007
J006
J067
J058
J059
J060
J061
J062
J063
J064
J069
ST04
REC SAVE
ST71
FL
10040730

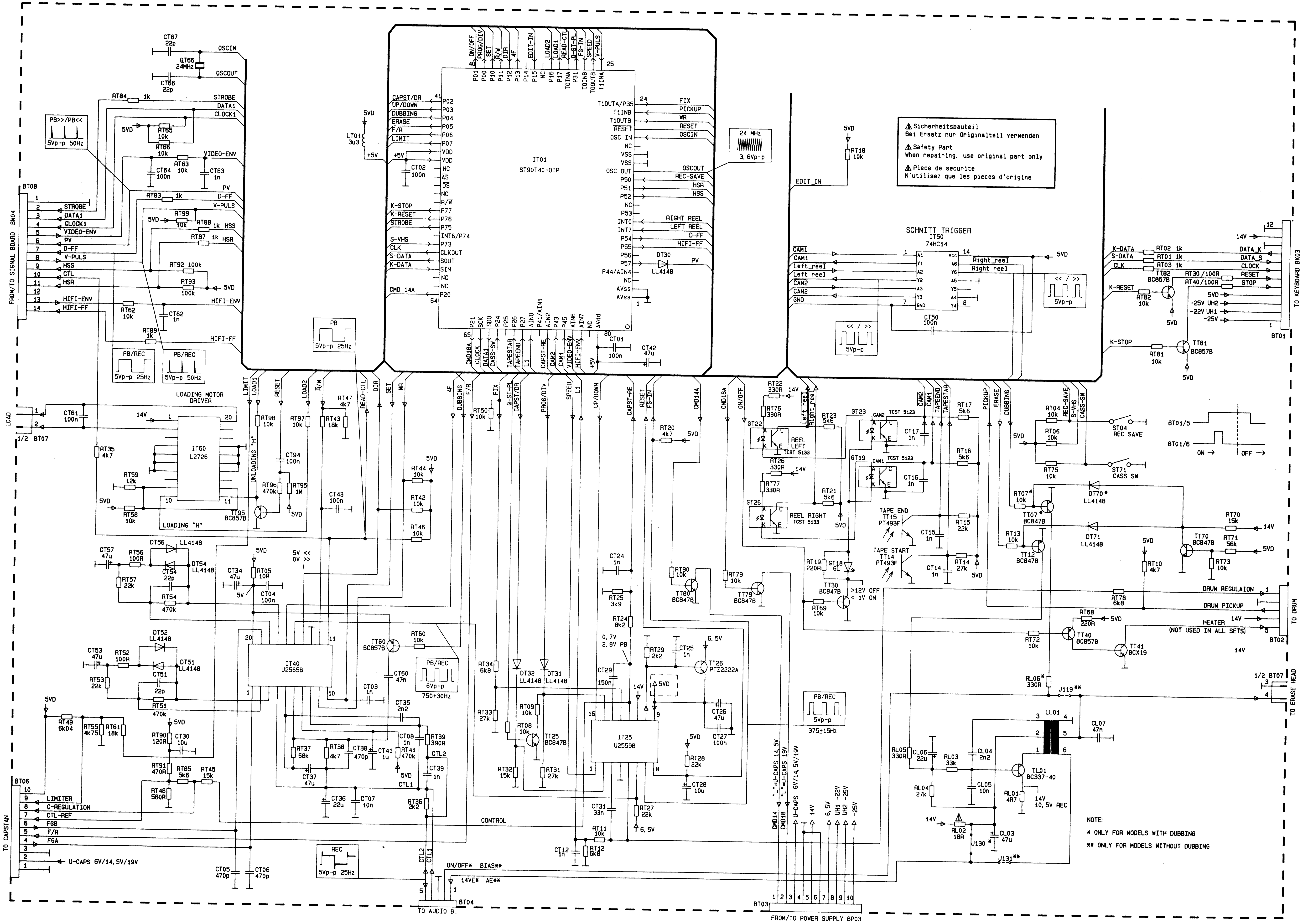
Schaltnetzteilplatte N1
Switch mode power supply board


BP01
CP01
LP01
LP02
DP02
DP04
DP03
DP01
RP08
CP08
DP08
CP06
DP16
RP34
CP34
TP34
JP08
LP40
CP52
RP51
DP51
CP51
JP22
JP11
CP61
CP53
BP03
RP56
DP56
TP81
RP81
RP86
RP87
TP86
CP624
RP41
DP61
DP42
LP51
DP41
CP41
JP28
DP76
JP19
DP77
TP83
DP86
DP82
DP81
LP52
LP81
CP81
CP82
CP55
CP21
JP06
RP50
RP27
RP38
RP37
DP13
CP19
TP35
RP15
CP71
JP23
JP09
DP71
LP71
JP24
CP90
JP20
CP72
BP02
RP12
CP11
JP02
JP05
IP01
CP20
RP47
JP10
DP15
CP26
CP28
RP71
DP92
BP05
CP92
JP17
LP91
CP93
RP99
JP21
JP25
TP71
CP15
CP31
CP35
DP11
DP91
RP98
DP74
JP18
RP18
TP21
RP36
DP54
RP54
CP54
DP53
TP91
BP04
RP91
RP92
DP94
RP76
PP91
TP92
TP93
TP73
JP26
TP72
CP60
TP75
TP76

Mecha
Mecha


PB>
5Vp-
BT08
FROM/TO SIGNAL BOARD BW04
1
2
3
4
5
6
7
8
9
10
11
12
13
14
LOAD
1
2
1/2 BT07
5V
BT06
10
9
8
7
6
5
4
3
2
1
TO CAPSTAN

Mechaniksteuerung/Servo
Mechacon/Servo

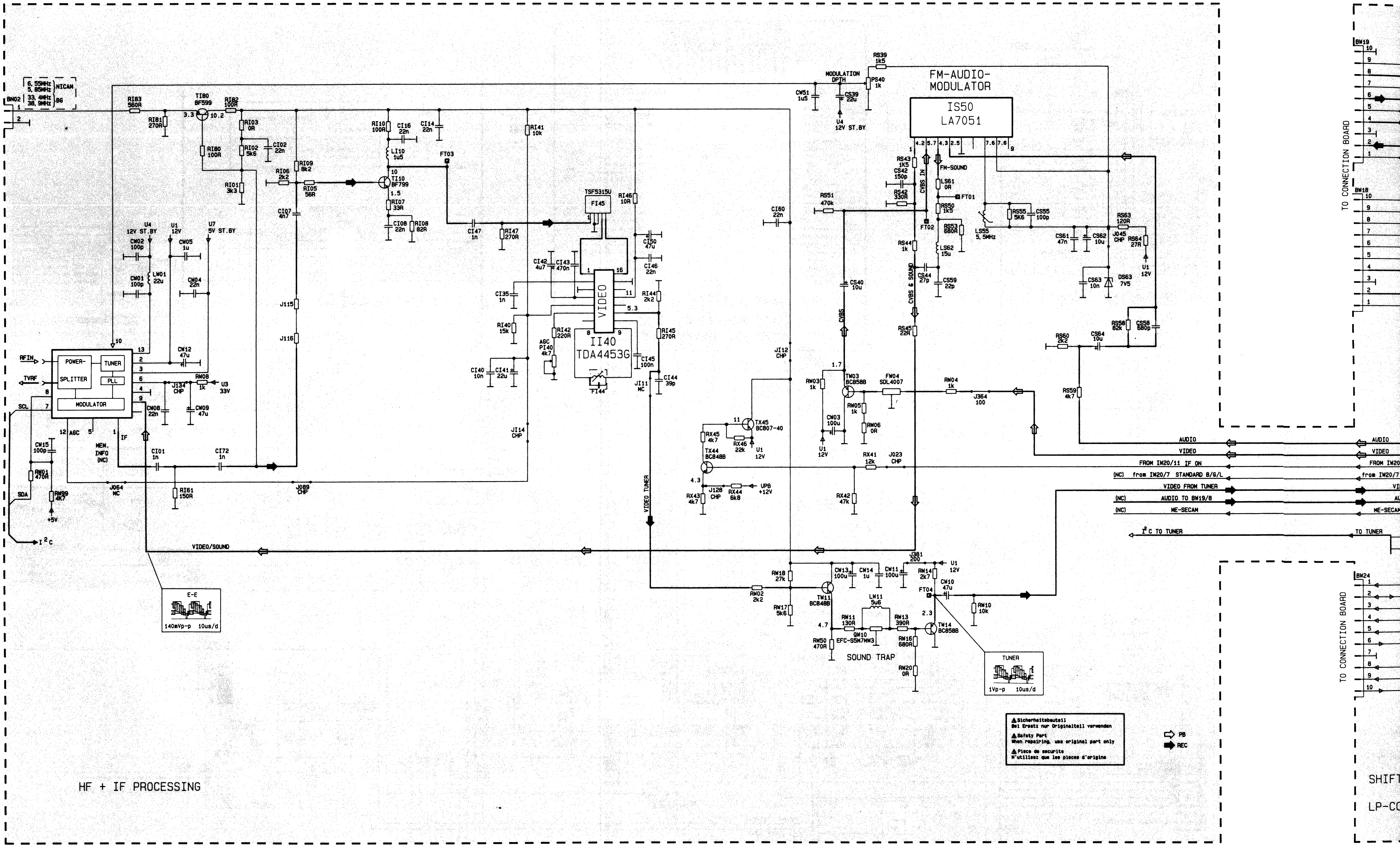

IT01
ST90T40-OTP
IT50
74HC14
SCHMITT TRIGGER
IT60
L2726
LOADING MOTOR DRIVER
IT40
U2565B
IT25
U2559B
LL01
TL01
BC337-40
QT66
24MHz
24 MHz
3, 6Vp-p
FROM/TO SIGNAL BOARD BW04
BT08
BT07
1/2 BT07
BT06
TO CAPSTAN
BT04
TO AUDIO B.
BT03
FROM/TO POWER SUPPLY BP03
BT02
TO DRUM
TO ERASE HEAD
BT01
TO KEYBOARD BK03
LOAD
STROBE
DATA1
CLOCK1
VIDEO-ENV
PV
D-FF
V-PULS
HSS
CTL
HSR
HIFI-ENV
HIFI-FF
OSCIN
OSCOUT
FIX
PICKUP
WR
RESET
REC-SAVE
RIGHT REEL
LEFT REEL
CAPST/DR
UP/DOWN
DUBBING
ERASE
F/R
LIMIT
K-STOP
K-RESET
S-VHS
CLK
S-DATA
K-DATA
CMD 14A
CMD18A
EDIT_IN
CAM1
CAM2
Left reel
Right reel
GND
DATA_K
DATA_S
CLOCK
STOP
PB>>/PB<<
5Vp-p 50Hz
PB
5Vp-p 25Hz
PB/REC
5Vp-p 25Hz
PB/REC
5Vp-p 50Hz
LOADING "H"
UNLOADING "H"
PB/REC
6Vp-p
750+30Hz
PB/REC
5Vp-p
375±15Hz
REC
5Vp-p 25Hz
<< / >>
5Vp-p
LIMITER
C-REGULATION
CTL-REF
FGB
F/R
FGA
U-CAPS 6V/14,5V/19V
CONTROL
ON/OFF* BIAS**
14VE* AE**
REEL LEFT
TCST 5133
REEL RIGHT
TCST 5133
TAPE END
TT15
PT493F
TAPE START
TT14
PT493F
ST04
REC SAVE
ST71
CASS SW
BT01/5
BT01/6
ON →
OFF →
DRUM REGULAION
DRUM PICKUP
HEATER
(NOT USED IN ALL SETS)
>12V OFF
< 1V ON
14V
10,5V REC
J119**
J130*
J131**
CMD14
CMD18
U-CAPS
"L"=U-CAPS 14,5V
"L"=U-CAPS 19V
6V/14,5V/19V
6,5V
UH1 -22V
UH2 -25V
-25V

⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden

⚠ Safety Part
When repairing, use original part only

⚠ Piece de securite
N'utilisez que les pieces d'origine

NOTE:
* ONLY FOR MODELS WITH DUBBING
** ONLY FOR MODELS WITHOUT DUBBING


TO HIFI BOARD
BN02
6,55MHz
5,85MHz
NICAM
33,4MHz
38,9MHz
B6
RI83 560R
RI81 270R
TI80 BF599
RI82 100R
RI03 0R
RI80 100R
RI02 5k6
CI02 22n
RI01 3k3
RI06 2k2
RI09 8k2
RI05 56R
CI07 4n7
RI10 100R
CI16 22n
CI14 22n
LI10 1u5
TI10 BF799
RI07 33R
CI08 22n
RI08 82R
FT03
CI47 1n
RI47 270R
RI41 10k
TSF5315U
FI45
RI46 10R
CI50 47u
CI46 22n
CI42 4u7
CI43 470n
CI35 1n
VIDEO
RI44 2k2
RI40 15k
RI42 220R
AGC PI40 4k7
II40
TDA4453G
RI45 270R
CI45 100n
CI44 39p
FI44
CI40 10n
CI41 22u
JI14 CHP
JI11 NC
JI12 CHP
J115
J116
U4 12V ST.BY
U1 12V
U7 5V ST.BY
CW02 100p
CW05 1u
CW01 100p
LW01 22u
CW04 22n
CW12 47u
RFIN
TVRF
POWER-SPLITTER
TUNER
PLL
MODULATOR
SCL
SDA
AGC
MEM. INFO (NC)
IF
J134 CHP
RW08 1k
U3 33V
CW08 22n
CW09 47u
CW15 100p
RW01 470R
RW99 4K7
+5V
I^2C
CI01 1n
CI72 1n
RI61 150R
J064 NC
J089 CHP
VIDEO/SOUND
E-E
140mVp-p 10us/d
VIDEO TUNER
MODULATION DPTH
RS39 1k5
PS40 1k
CW51 1u5
CS39 22u
U4 12V ST.BY
FM-AUDIO-MODULATOR
IS50
LA7051
RS43 1K5
CS42 150p
RS42 330R
CVBS IN
FM-SOUND
LS61 0R
FT01
RS50 1k5
FT02
RS53 680R
LS55 5,5MHz
RS55 5K6
CS55 100p
RS51 470k
CI60 22n
RS44 1k
LS62 15u
CS44 27p
CS59 22p
CVBS & SOUND
CS40 10u
CVBS
RS45 22R
CS61 47n
CS62 10u
J045 CHP
RS63 120R
RS64 27R
U1 12V
CS63 10n
DS63 7V5
RS58 82k
CS58 680p
RS60 2k2
CS64 10u
RS59 4k7
TW03 BC858B
FW04 SDL4007
RW04 1k
J364 100
RW03 1k
RW05 1k
RW06 0R
CW03 100u
U1 12V
TX45 BC807-40
RX45 4k7
RX46 22k
TX44 BC848B
RX41 12k
J023 CHP
RX43 4k7
J128 CHP
RX44 6k8
UPB +12V
RX42 47k
AUDIO
VIDEO
FROM IW20/11 IF ON
(NC) from IW20/7 STANDARD B/G/L
VIDEO FROM TUNER
(NC) AUDIO TO BW19/8
(NC) ME-SECAM
I^2C TO TUNER
J381 200
U1 12V
RW18 27k
CW13 100u
CW14 1u
CW11 100u
RW14 2k7
FT04
CW10 47u
RW10 10k
RW02 2k2
TW11 BC848B
RW17 5k6
LW11 5u6
RW11 130R
RW13 390R
QW10 EFC-S5M7MW3
TW14 BC858B
RW50 470R
RW16 680R
RW20 0R
SOUND TRAP
TUNER
1Vp-p 10us/d
⇨ PB
➡ REC
HF + IF PROCESSING
TO CONNECTION BOARD
BW19
BW18
BW24
AUDIO
VIDEO
FROM IW20
from IW20/7
TO TUNER
SHIFT
LP-C

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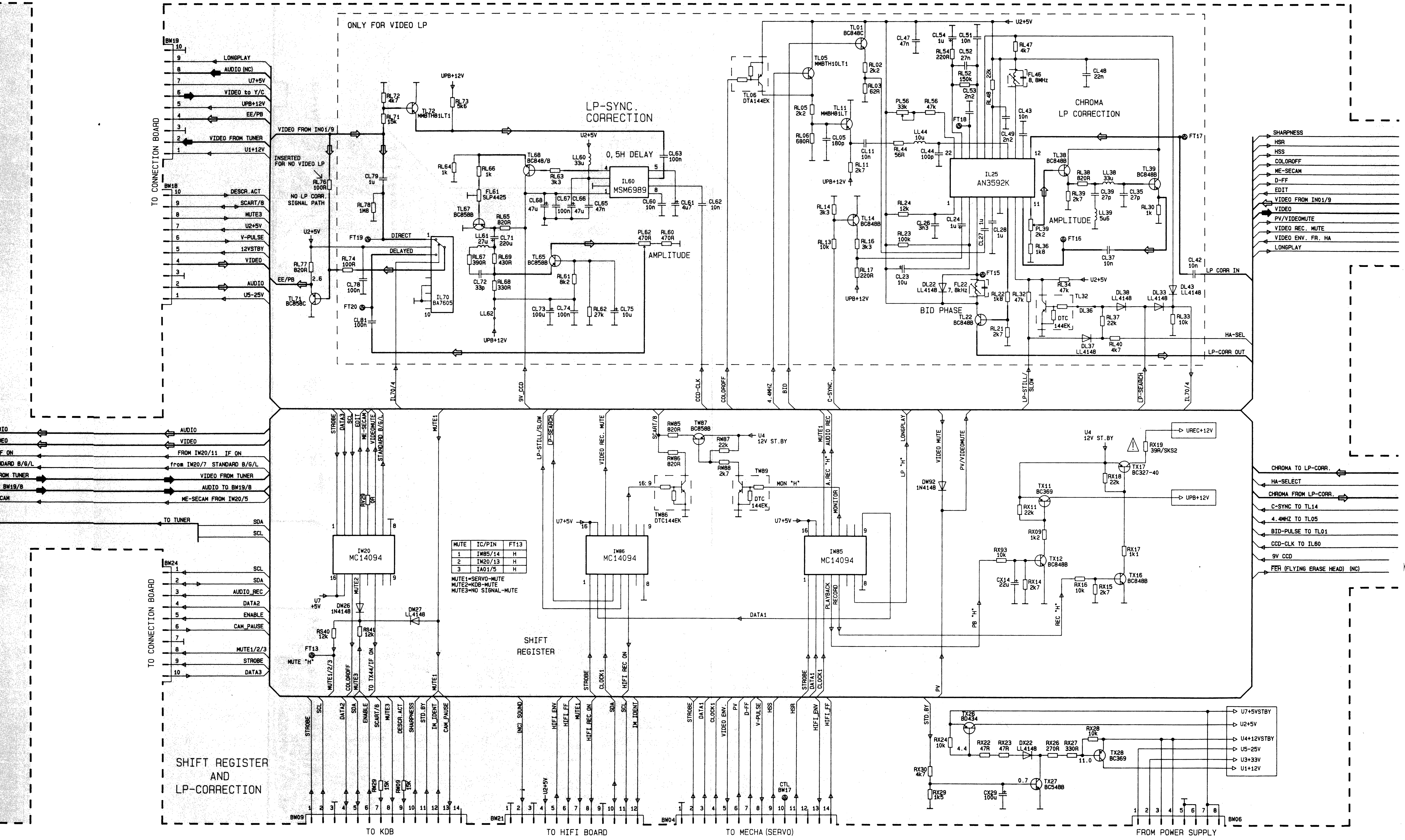
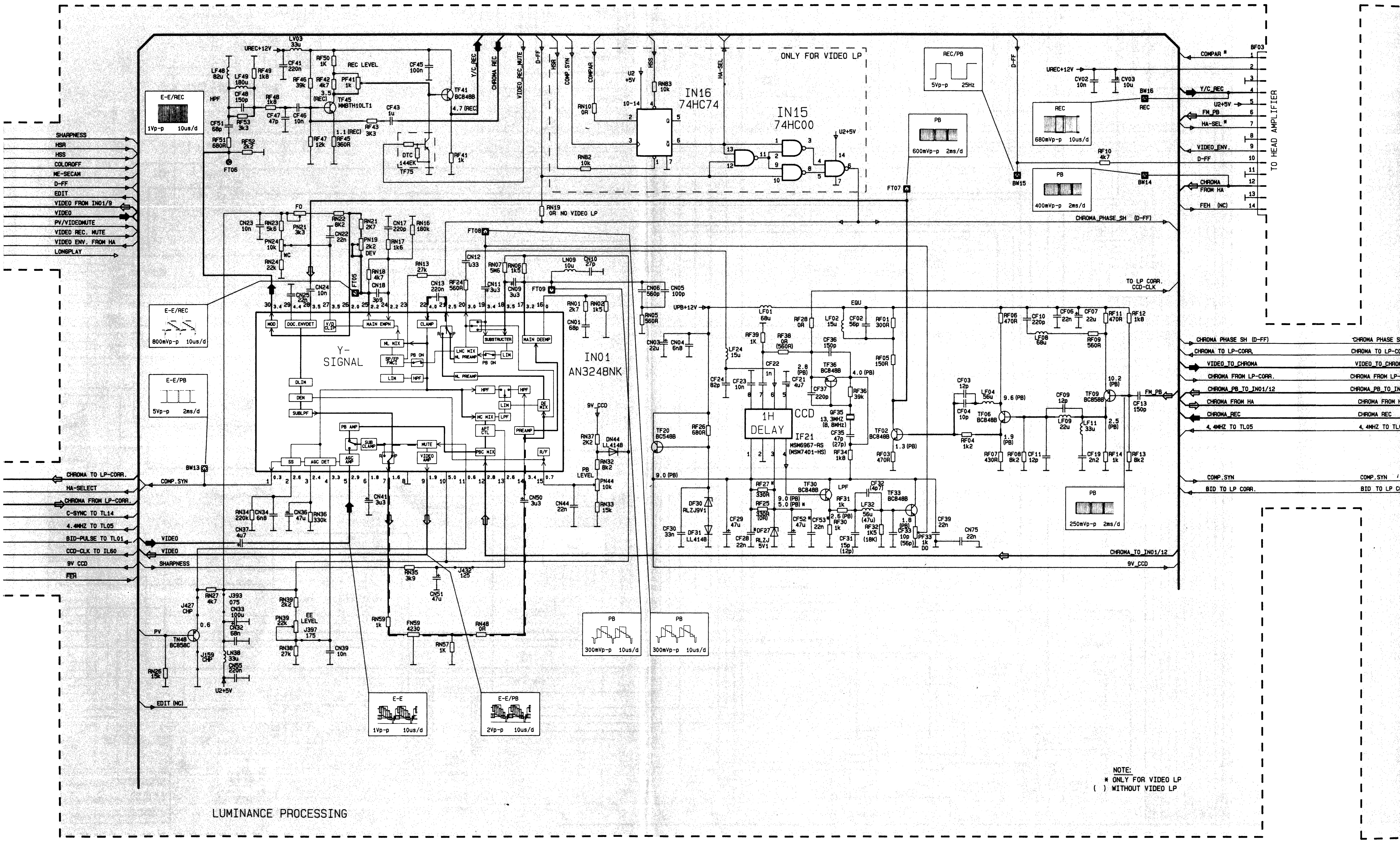
Schieberegister und Video Longplay
Shift register and video longplay correction


ONLY FOR VIDEO LP
LP-SYNC. CORRECTION
0,5H DELAY
AMPLITUDE
CHROMA LP CORRECTION
AMPLITUDE
BID PHASE
SHIFT REGISTER
SHIFT REGISTER AND LP-CORRECTION
TO CONNECTION BOARD
TO KDB
TO HIFI BOARD
TO MECHA (SERVO)
FROM POWER SUPPLY
BW19
BW18
BW24
BW09
BW21
BW04
BW06
LONGPLAY
AUDIO (NC)
U7+5V
VIDEO to Y/C
UPB+12V
EE/PB
VIDEO FROM TUNER
U1+12V
DESCR.ACT
SCART/8
MUTE3
U2+5V
V-PULSE
12VSTBY
VIDEO
AUDIO
U5-25V
VIDEO FROM IN01/9
INSERTED FOR NO VIDEO LP
NO LP CORR. SIGNAL PATH
DIRECT
DELAYED
IL60 MSM6989
IL70 BA7605
IL25 AN3592K
IW20 MC14094
IW86 MC14094
IW85 MC14094
TL72 MMBTH81LT1
TL68 BC848B
TL67 BC858B
TL65 BC858B
TL71 BC858C
TL01 BC848C
TL05 MMBTH10LT1
TL06 DTA144EK
TL11 MMBH81LT
TL14 BC848B
TL38 BC848B
TL39 BC848B
TL22 BC848B
TL32 DTC 144EK
FL46 8,8MHz
FL22 7,8kHz
FL61 SLP4425
CL42 10n
LP CORR IN
HA-SEL
LP-CORR OUT
SHARPNESS
HSR
HSS
COLOROFF
ME-SECAM
D-FF
EDIT
VIDEO FROM IN01/9
VIDEO
PV/VIDEOMUTE
VIDEO REC. MUTE
VIDEO ENV. FR. HA
LONGPLAY
IL70/4
9V_CCD
CCD-CLK
COLOROFF
4.4MHZ
BID
C-SYNC.
LP-STILL/SLOW
LP-SEARCH
AUDIO
VIDEO
FROM IW20/11 IF ON
from IW20/7 STANDARD B/G/L
VIDEO FROM TUNER
AUDIO TO BW19/8
ME-SECAM FROM IW20/5
TO TUNER
SDA
SCL
AUDIO_REC
DATA2
ENABLE
CAM_PAUSE
MUTE1/2/3
STROBE
DATA3
MUTE "H"
FT13
DATA1
CLOCK1
HIFI REC ON
VIDEO REC. MUTE
SCART/8
TW87 BC858B
TW86 DTC144EK
TW89 DTC 144EK
MON "H"
16:9
U4 12V ST.BY
MONITOR
A.REC "H" AUDIO REC
LP "H"
VIDEO MUTE
PV/VIDEOMUTE
DW92 1N4148
PLAYBACK RECORD
PB "H"
REC "H"
UREC+12V
UPB+12V
TX17 BC327-40
TX11 BC369
TX12 BC848B
TX16 BC848B
RX19 39R/SKS2
CHROMA TO LP-CORR.
HA-SELECT
CHROMA FROM LP-CORR.
C-SYNC TO TL14
4.4MHZ TO TL05
BID-PULSE TO TL01
CCD-CLK TO IL60
9V CCD
FEH (FLYING ERASE HEAD) (NC)
STROBE
SCL
DATA2
SDA
ENABLE
SCART/8
MUTE3
DESCR.ACT
SHARPNESS
STD.BY
IW_IDENT
CAM_PAUSE
(NC) SOUND
U2+5V
HIFI_ENV
HIFI_FF
MUTE1
HIFI_REC_ON
IW_IDENT
DATA1
CLOCK1
VIDEO ENV.
PV
D-FF
V-PULSE
HSS
HSR
HIFI_ENV
HIFI_FF
CTL BW17
STD.BY
TX26 BD434
TX27 BC548B
TX28 BC369
U7+5VSTBY
U2+5V
U4+12VSTBY
U5-25V
U3+33V
U1+12V

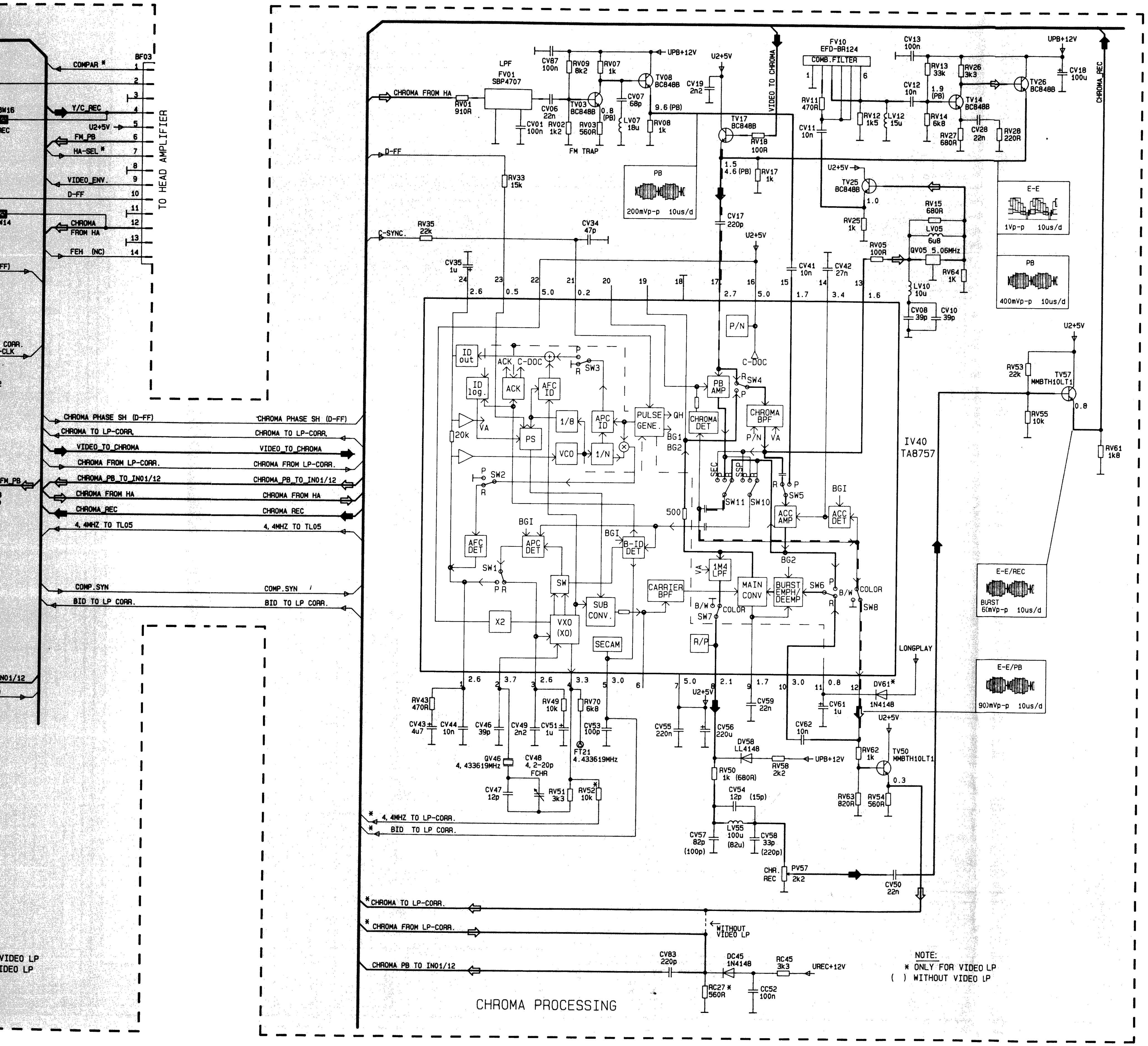
MUTE	IC/PIN	FT13
1	IW85/14	H
2	IW20/13	H
3	IA01/5	H

MUTE1=SERVO-MUTE
MUTE2=KDB-MUTE
MUTE3=NO SIGNAL-MUTE

Video-Luminanz
Video-Luminance

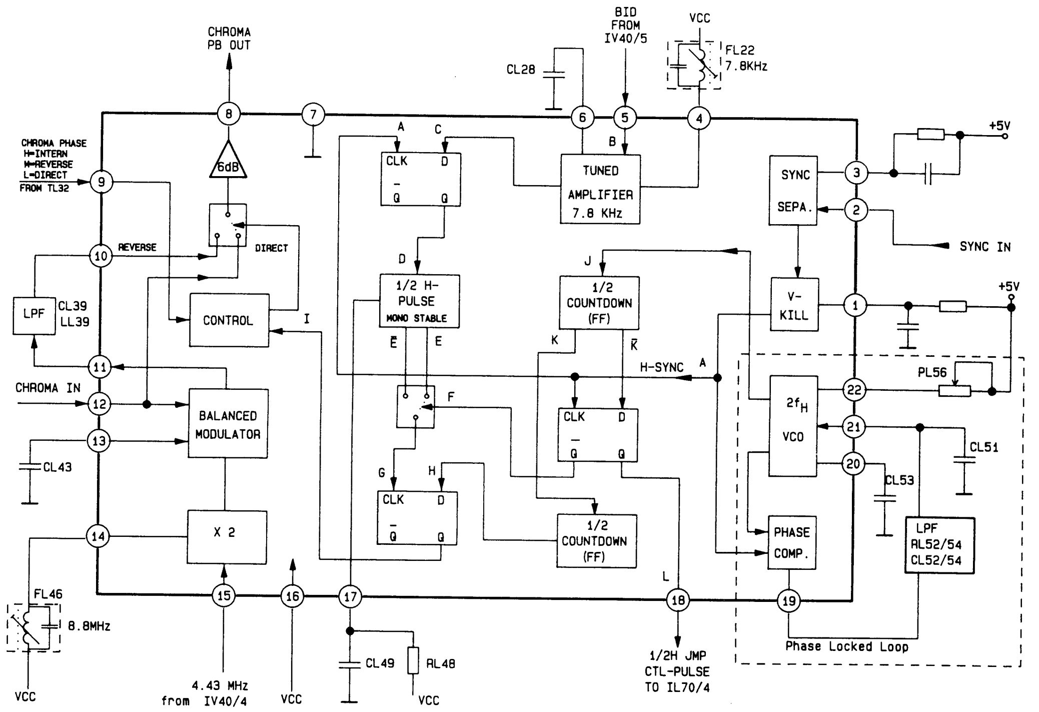

LUMINANCE PROCESSING
ONLY FOR VIDEO LP
IN16
74HC74
IN15
74HC00
IN01
AN3248NK
Y-SIGNAL
1H DELAY
CCD
IF21
MSM6967-RS
(MSM7401-HS)
TO HEAD AMPLIFIER
BF03
COMPAR *
UREC+12V
Y/C_REC
U2+5V
FM_PB
HA-SEL *
VIDEO_ENV.
D-FF
CHROMA FROM HA
FEH (NC)
CHROMA_PHASE_SH (D-FF)
TO LP CORR. CCD-CLK
CHROMA PHASE SH (D-FF)
CHROMA TO LP-CORR.
VIDEO_TO_CHROMA
CHROMA FROM LP-CORR.
CHROMA_PB_TO_IN01/12
CHROMA FROM HA
CHROMA_REC
4.4MHZ TO TL05
COMP.SYN
BID TO LP CORR.
CHROMA_TO_IN01/12
9V_CCD
SHARPNESS
HSR
HSS
COLOROFF
ME-SECAM
D-FF
EDIT
VIDEO FROM IN01/9
VIDEO
PV/VIDEOMUTE
VIDEO REC. MUTE
VIDEO ENV. FROM HA
LONGPLAY
CHROMA TO LP-CORR.
HA-SELECT
CHROMA FROM LP-CORR.
C-SYNC TO TL14
4.4MHZ TO TL05
BID-PULSE TO TL01
CCD-CLK TO IL60
9V CCD
FEH
COMP.SYN
VIDEO
VIDEO
SHARPNESS
PV
EDIT (NC)
Y/C_REC
CHROMA_REC
VIDEO_REC_MUTE
D-FF
HSR
COMP.SYN
COMPAR
HSS
HA-SEL
D-FF
REC LEVEL
EE LEVEL
PB LEVEL
RN19 0R NO VIDEO LP
E-E/REC 1Vp-p 10us/d
E-E/REC 800mVp-p 10us/d
E-E/PB 5Vp-p 2ms/d
REC/PB 5Vp-p 25Hz
PB 600mVp-p 2ms/d
REC 680mVp-p 10us/d
PB 400mVp-p 2ms/d
PB 250mVp-p 2ms/d
PB 300mVp-p 10us/d
PB 300mVp-p 10us/d
E-E 1Vp-p 10us/d
E-E/PB 2Vp-p 10us/d
TF41 BC848B
TF45 MMBTH10LT1
DTC 144EK TF75
TN48 BC858C
TF20 BC548B
TF36 BC848B
TF30 BC848B
TF33 BC848B
TF02 BC848B
TF06 BC848B
TF09 BC858B
DF30 RLZJ9V1
DF31 LL4148
DF27 RLZJ 5V1
DN44 LL4148
MOD
DOC.ENVDET
Y/C CLIP
MAIN EMPH
CLAMP
SUBSTRUCTER
MAIN DEEMP
NL MIX
SP/EP FMCT
PB ON
LNC MIX
NL PREAMP
LIM
HPF
DLIM
DEM
SUBLPF
PB AMP
SUB CLAMP
AGC AMP
SS
AGC DET
MUTE
VIDEO AMP
PBC MIX
APT CTL
LPF
NC MIX
DE MIX
PREAMP
R/F
FT05
FT06
FT07
FT08
FT09
BW13
BW14
BW15
BW16
NOTE:
* ONLY FOR VIDEO LP
( ) WITHOUT VIDEO LP

Video-Chroma
Video chrominance

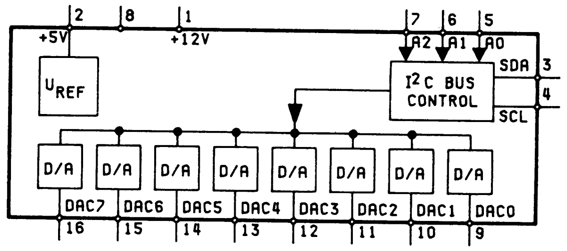

TO HEAD AMPLIFIER
BF03
COMPAR *
Y/C_REC
U2+5V
FM_PB
HA-SEL *
VIDEO_ENV.
D-FF
CHROMA FROM HA
FEH (NC)
CHROMA FROM HA
LPF
FV01
SBP4707
RV01
910R
CV87
100n
RV09
8k2
RV07
1k
UPB+12V
U2+5V
TV08
BC848B
CV19
2n2
TV03
BC848B
CV06
22n
CV01
100n
RV02
1k2
RV03
560R
LV07
18u
RV08
1k
CV07
68p
FM TRAP
TV17
BC848B
RV18
100R
VIDEO TO CHROMA
FV10
EFD-BR124
COMB.FILTER
CV11
10n
RV11
470R
RV12
1k5
LV12
15u
CV13
100n
RV13
33k
RV26
3k3
CV12
10n
TV14
BC848B
RV14
6k8
RV27
680R
CV28
22n
RV28
220R
TV26
BC848B
CV18
100u
UPB+12V
CHROMA_REC
D-FF
RV33
15k
PB
200mVp-p 10us/d
RV17
1k
U2+5V
TV25
BC848B
RV25
1k
RV15
680R
LV05
6u8
RV05
100R
QV05 5.06MHz
RV64
1K
LV10
10u
CV08
39p
CV10
39p
E-E
1Vp-p 10us/d
PB
400mVp-p 10us/d
C-SYNC.
RV35
22k
CV34
47p
CV17
220p
CV35
1u
CV41
10n
CV42
27n
IV40
TA8757
ID out
ID log.
ACK
C-DOC
AFC ID
SW3
1/8
APC ID
PULSE GENE.
QH
BG1
BG2
PB AMP
SW4
CHROMA BPF
CHROMA DET
P/N
C-DOC
VCO
1/N
PS
SW2
SEC
SSP
SW11
SW10
SW5
ACC AMP
ACC DET
BGI
AFC DET
APC DET
B-ID DET
SW1
SW
X2
VXO (XO)
SUB CONV.
SECAM
CARRIER BPF
1M4 LPF
MAIN CONV
BURST EMPH/ DEEMP
SW6
COLOR
SW8
B/W
SW7
R/P
BG2
500
20k
U2+5V
RV53
22k
TV57
MMBTH10LT1
RV55
10k
RV61
1k8
E-E/REC
BURST
6mVp-p 10us/d
E-E/PB
90mVp-p 10us/d
LONGPLAY
DV61*
1N4148
CV61
1u
RV43
470R
CV43
4u7
CV44
10n
CV46
39p
CV49
2n2
CV51
1u
RV49
10k
RV70
6k8
CV53
100p
FT21
4.433619MHz
QV46
4.433619MHz
CV48
4.2-20p
FCHR
CV47
12p
RV51
3k3
RV52
10k
CV55
220n
CV56
220u
CV59
22n
CV62
10n
DV58
LL4148
RV58
2k2
UPB+12V
RV50
1k (680R)
CV54
12p (15p)
LV55
100u (82u)
CV57
82p (100p)
CV58
33p (220p)
RV62
1k
TV50
MMBTH10LT1
RV63
820R
RV54
560R
CHR. REC
PV57
2k2
CV50
22n
CHROMA PHASE SH (D-FF)
CHROMA TO LP-CORR.
VIDEO_TO_CHROMA
CHROMA FROM LP-CORR.
CHROMA_PB_TO_IN01/12
CHROMA FROM HA
CHROMA_REC
4.4MHZ TO TL05
COMP.SYN
BID TO LP CORR.
* 4.4MHZ TO LP-CORR.
* BID TO LP CORR.
* CHROMA TO LP-CORR.
* CHROMA FROM LP-CORR.
WITHOUT VIDEO LP
CHROMA PB TO IN01/12
CV83
220p
DC45
1N4148
RC45
3k3
UREC+12V
RC27 *
560R
CC52
100n
VIDEO LP
CHROMA PROCESSING

NOTE:
* ONLY FOR VIDEO LP
( ) WITHOUT VIDEO LP

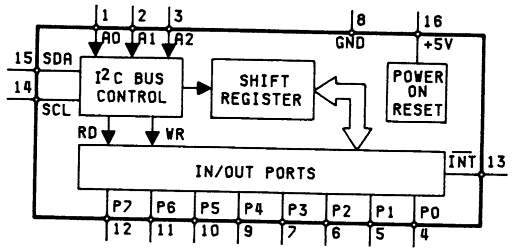
IC-AN 3592 K


CHROMA PB OUT
BID FROM IV40/5
VCC
FL22
7.8KHz
CL28
CHROMA PHASE H=INTERN M=REVERSE L=DIRECT FROM TL32
6dB
REVERSE
DIRECT
CONTROL
CLK
TUNED AMPLIFIER 7.8 KHz
SYNC SEPA.
V-KILL
+5V
SYNC IN
1/2 H-PULSE MONO STABLE
1/2 COUNTDOWN (FF)
H-SYNC
LPF
CL39
LL39
CHROMA IN
BALANCED MODULATOR
CL43
X 2
2f H
VCO
PL56
CL51
CL53
PHASE COMP.
LPF RL52/54 CL52/54
Phase Locked Loop
FL46
8.8MHz
VCC
4.43 MHz from IV40/4
CL49
RL48
1/2H JMP CTL-PULSE TO IL70/4

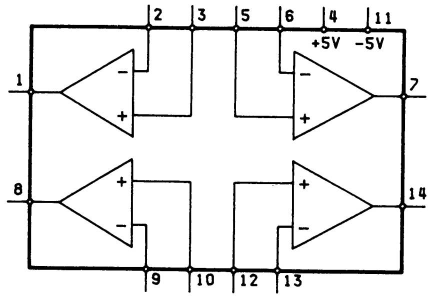
IC-TDA 8444 T


+5V
+12V
U REF
A2
A1
A0
I2C BUS CONTROL
SDA
SCL
D/A
DAC7
DAC6
DAC5
DAC4
DAC3
DAC2
DAC1
DAC0

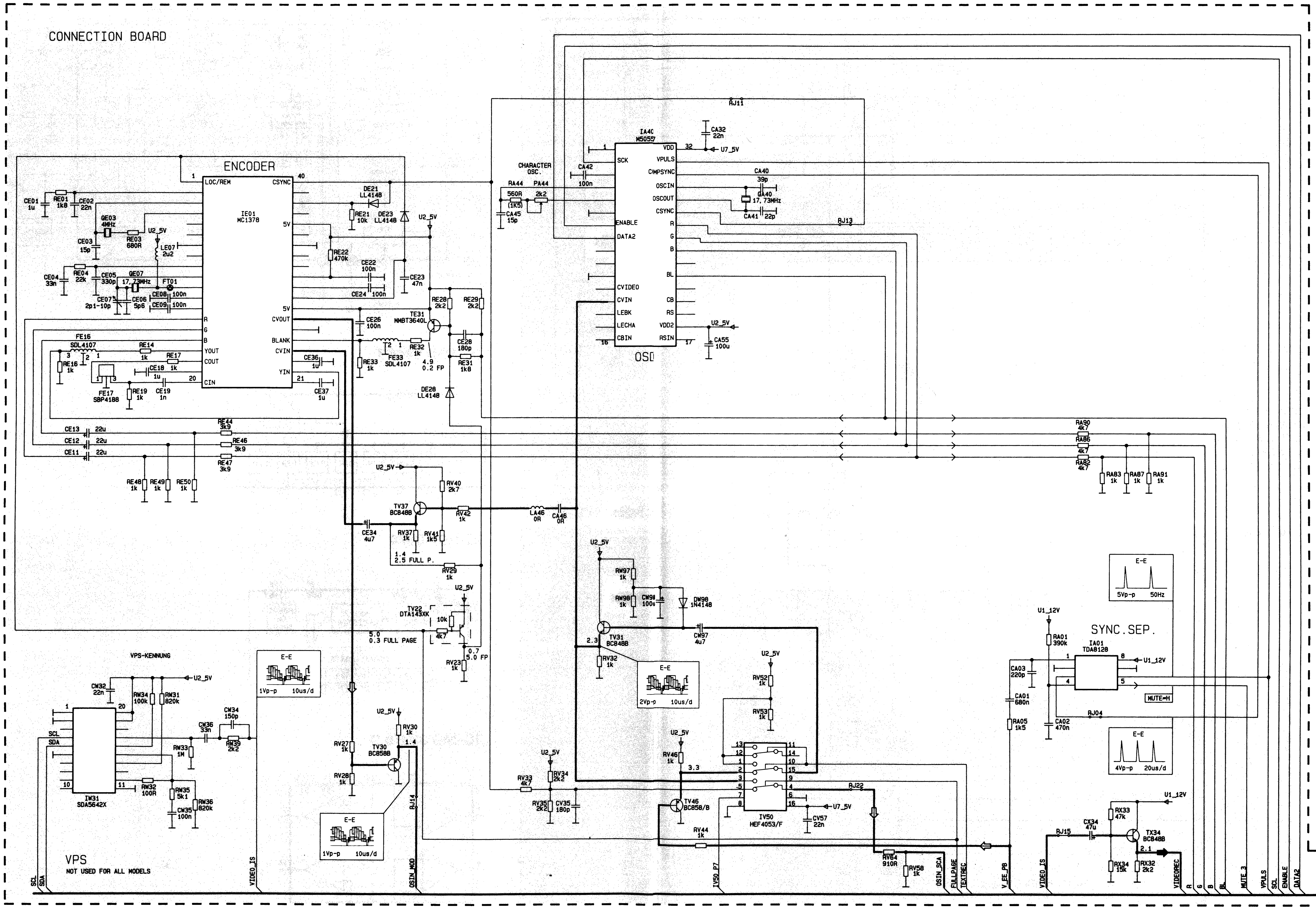
IC-PCF 8574


A0
A1
A2
GND
+5V
SDA
SCL
I2C BUS CONTROL
SHIFT REGISTER
POWER ON RESET
RD
WR
IN/OUT PORTS
INT
P7
P6
P5
P4
P3
P2
P1
P0

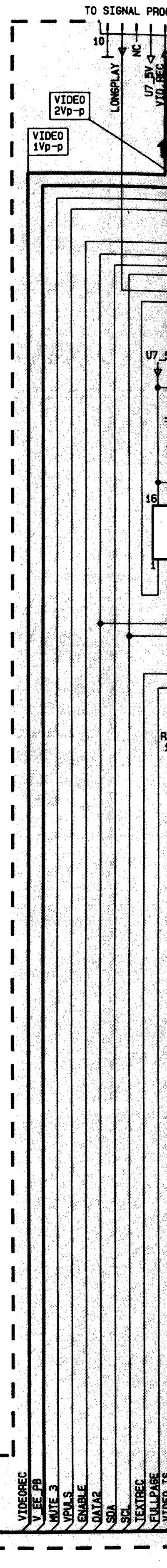
IC-MC 33079 D



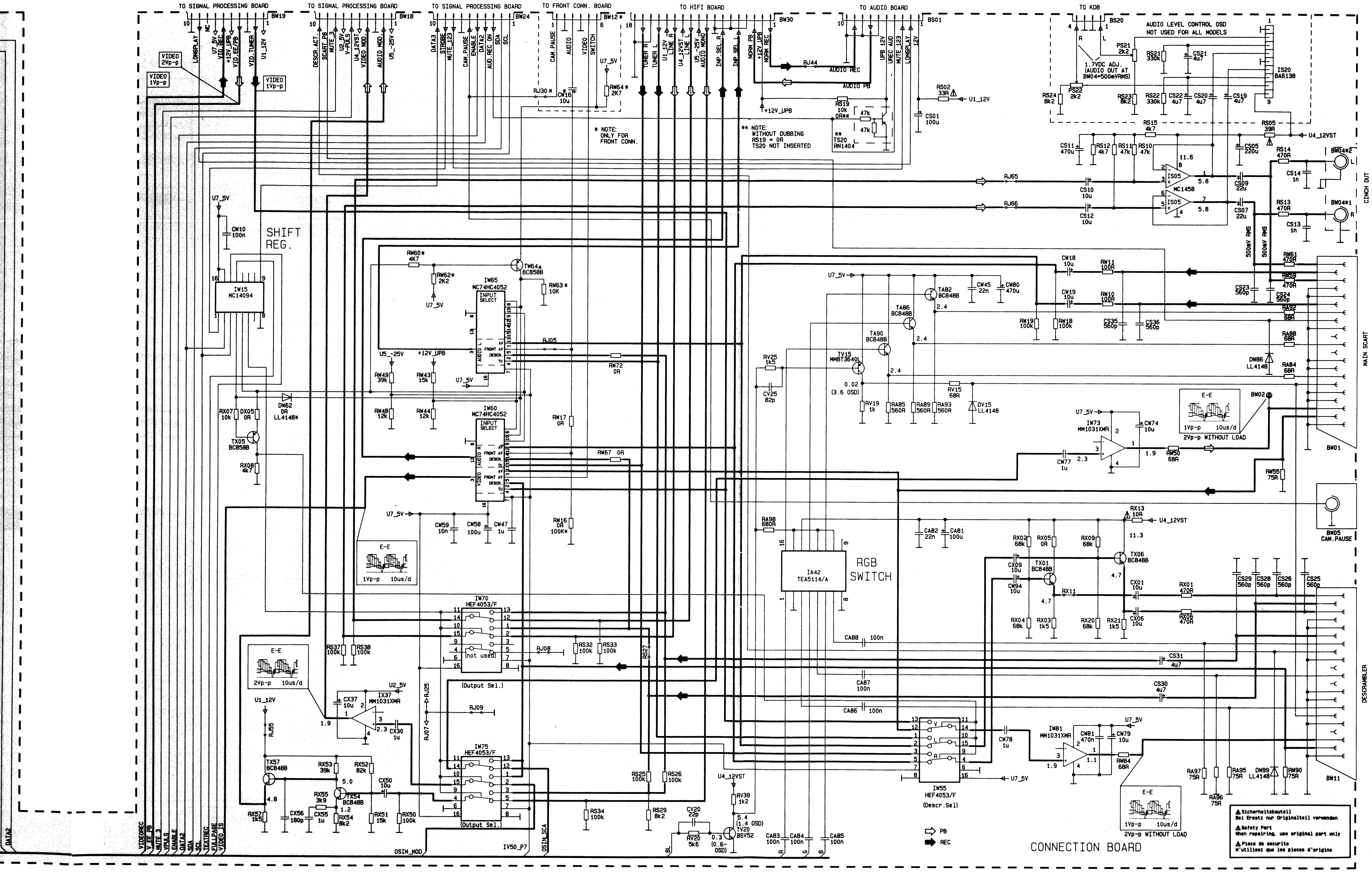
OSD/VPS/Encoder


CONNECTION BOARD
ENCODER
IE01
MC1378
LOC/REM
CSYNC
5V
CVOUT
BLANK
CVIN
YIN
YOUT
COUT
CIN
R
G
B
OSD
IA40
M5057
SCK
VPULS
COMPSYNC
OSCIN
OSCOUT
CSYNC
ENABLE
DATA2
CVIDEO
CVIN
LEBK
LECHA
CBIN
VDD
VDD2
RSIN
CHARACTER OSC.
RJ11
RJ13
TE31
MMBT3640L
TV37
BC848B
TV22
DTA143XK
TV31
BC848B
TV30
BC858B
TV46
BC858/B
IV50
HEF4053/F
SYNC.SEP.
IA01
TDA8128
TX34
BC848B
MUTE-H
IW31
SDA5642X
VPS-KENNUNG
VPS
NOT USED FOR ALL MODELS
E-E
1Vp-p 10us/d
2Vp-p 10us/d
5Vp-p 50Hz
4Vp-p 20us/d
U2_5V
U7_5V
U1_12V
5.0
0.3 FULL PAGE
1.4
2.5 FULL P.
0.7
5.0 FP
4.9
0.2 FP
SCL
SDA
VIDEO_IS
OSIN_MOD
IV50_P7
OSIN_SCA
FULLPAGE
TEXTREC
V_EE_PB
VIDEO_IS
VIDEOREC
R
G
B
BL
MUTE_3
VPULS
SCL
ENABLE
DATA2

Scartanschlu
Scart connec


TO SIGNAL PRO
VIDEO
2Vp-p
VIDEO
1Vp-p
LONGPLAY
VIDEOREC
V_EE_PB
MUTE_3
VPULS
ENABLE
DATA2
SDA
SCL
TEXTREC
FULLPAGE

Scartanschluß/Signalumschaltung
Scart connector/signal switching

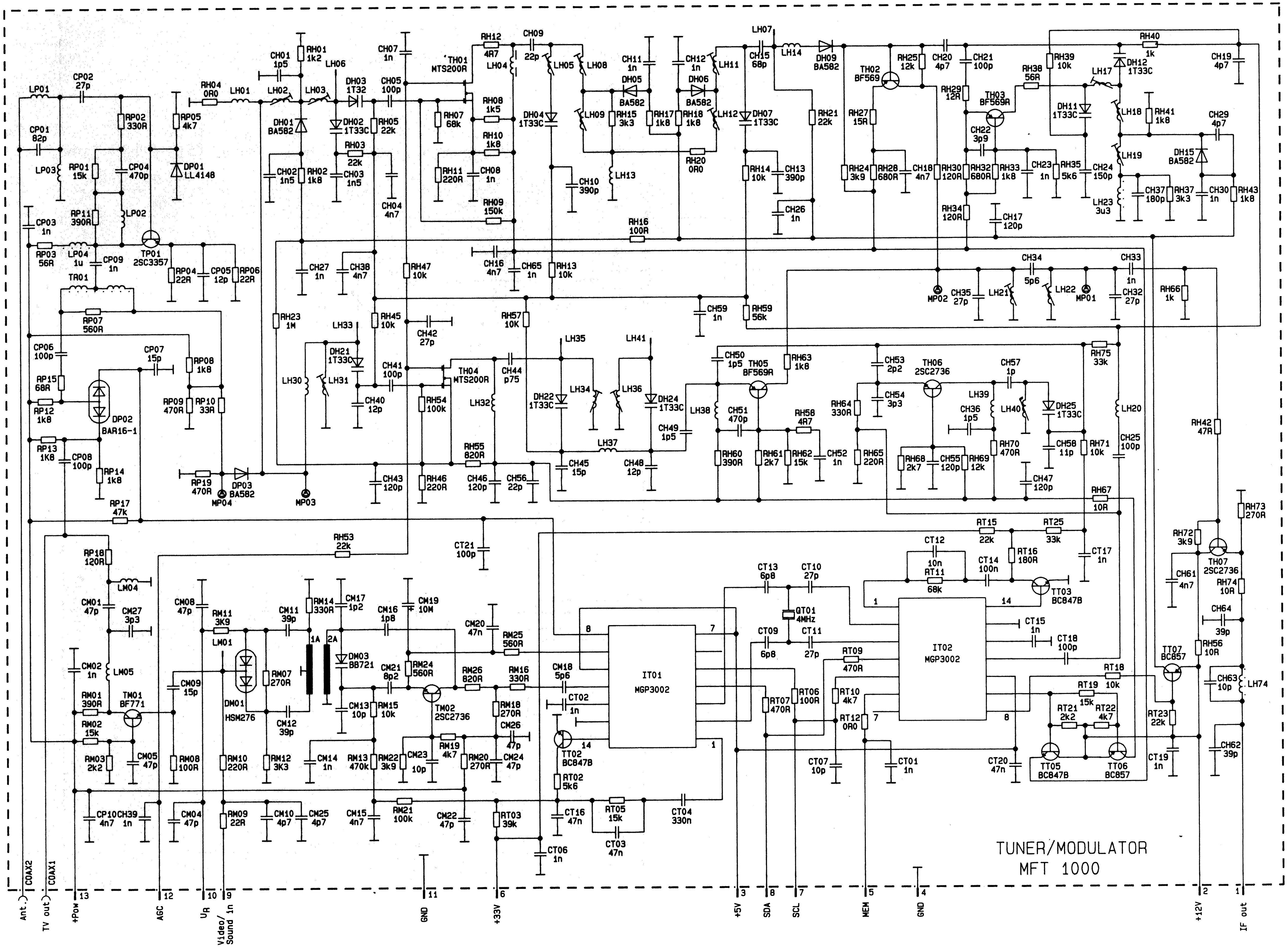

TO SIGNAL PROCESSING BOARD
TO SIGNAL PROCESSING BOARD
TO SIGNAL PROCESSING BOARD
TO FRONT CONN. BOARD
TO HIFI BOARD
TO AUDIO BOARD
TO KDB
BW19
BW18
BW24
BW12
BW30
BS01
BS20
AUDIO LEVEL CONTROL OSD
NOT USED FOR ALL MODELS
IS20 BA6138
1.7VDC ADJ. (AUDIO OUT AT BW04=500mVRMS)
VIDEO 2Vp-p
VIDEO 1Vp-p
LONGPLAY
U7_5V
VID.REC
+12V_UPB
VID.EE/PB
VID.TUNER
U1_12V
DESCR.ACT.
SCART PB
MUTE_3
U2_5V
V-PULS
U4_12VST
VIDEO MOD.
AUDIO MOD.
U5_-25V
DATA3
STROBE
MUTE_123
CAM.PAUSE
ENABLE
DATA2
AUD.REC ON
SDA
SCL
AUDIO
VIDEO
SWITCH
TUNER R
TUNER L
LINE R
LINE L
AUDIO MONO
INP.SEL.R
INP.SEL.L
NORM PB
NORM REC
UPB 12V
UREC AUD
AUDIO REC
AUDIO PB
* NOTE: ONLY FOR FRONT CONN.
** NOTE: WITHOUT DUBBING RS19 = 0R TS20 NOT INSERTED
SHIFT REG.
IW15 MC14094
IW65 MC74HC4052
IW60 MC74HC4052
INPUT SELECT
IS05 MC1458
CINCH OUT
BW04#2 L
BW04#1 R
MAIN SCART
BW01
BW02
BW05 CAM.PAUSE
DESCRAMBLER
BW11
RGB SWITCH
IA42 TEA5114/A
IW70 HEF4053/F
IW75 HEF4053/F
IW55 HEF4053/F (Descr.Sel)
(Output Sel.)
(not used)
IW73 MM1031XMR
IW81 MM1031XMR
IX37 MM1031XMR
E-E 1Vp-p 10us/d
E-E 2Vp-p 10us/d
1Vp-p 10us/d 2Vp-p WITHOUT LOAD
PB
REC
CONNECTION BOARD
VIDEOREC
V_EE_PB
MUTE_3
VPULS
ENABLE
DATA2
SDA
SCL
DATA3
TEXTREC
FULPAGE
VIDEO_IS
OSIN_MOD
IV50_P7
OSIN_SCA
DATA2
500mV RMS
500mV RMS

⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden

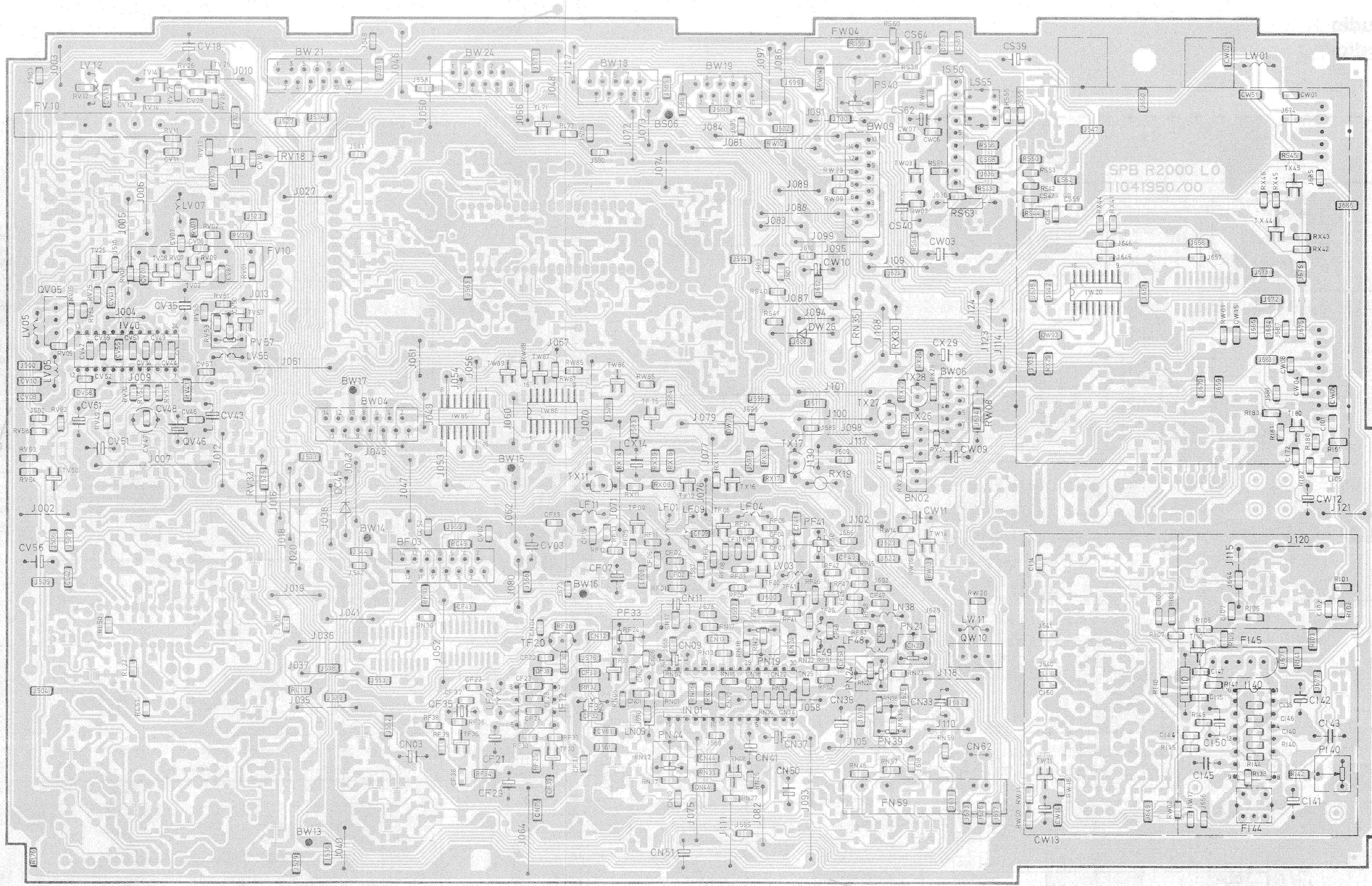
⚠ Safety Part
When repairing, use original part only

⚠ Piece de securite
N'utilisez que les pieces d'origine

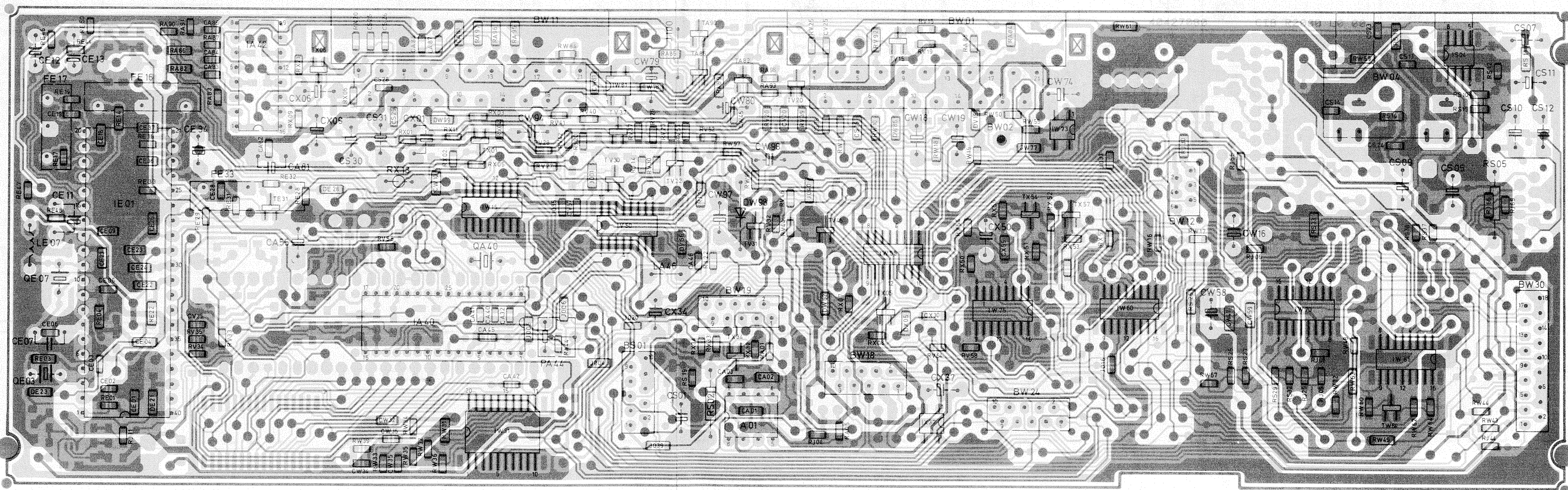
Tuner/Modulator
Tuner/Modulator


TUNER/MODULATOR
MFT 1000
LP01
CP02 27p
CP01 82p
RP02 330R
RP05 4k7
RH04 0R0
LH01
LH02
LH03
DP01 LL4148
LP03
RP01 15k
CP04 470p
RP11 390R
LP02
CP03 1n
RP03 56R
LP04 1u
CP09 1n
TP01 2SC3357
TR01
RP04 22R
CP05 12p
RP06 22R
RP07 560R
CP06 100p
CP07 15p
RP08 1k8
RP15 68R
RP12 1k8
DP02 BAR16-1
RP09 470R
RP10 33R
RP13 1K8
CP08 100p
RP14 1k8
RP19 470R
DP03 BA582
MP04
MP03
RP17 47k
RP18 120R
CH01 1p5
RH01 1k2
LH06
DH01 BA582
DH02 1T33C
DH03 1T32
CH05 100p
CH07 1n
RH05 22k
RH03 22k
CH02 1n5
RH02 1k8
CH03 1n5
CH04 4n7
CH27 1n
CH38 4n7
RH47 10k
RH45 10k
CH42 27p
RH23 1M
LH33
DH21 1T33C
LH30
LH31
CH41 100p
CH40 12p
CH43 120p
RH46 220R
TH01 MTS200R
RH12 4R7
CH09 22p
LH04
LH05
RH08 1k5
RH07 68k
RH10 1k8
RH11 220R
CH08 1n
RH09 150k
DH04 1T33C
CH10 390p
CH16 4n7
CH65 1n
RH13 10k
RH57 10K
TH04 MTS200R
CH44 p75
RH54 100k
LH32
RH55 820R
CH46 120p
CH56 22p
LH08
CH11 1n
DH05 BA582
LH09
RH15 3k3
LH13
RH17 1k8
RH18 1k8
CH12 1n
DH06 BA582
LH11
LH12
DH07 1T33C
RH20 0R0
RH16 100R
RH14 10k
CH13 390p
CH26 1n
CH59 1n
RH59 56k
LH35
LH41
DH22 1T33C
LH34
LH36
DH24 1T33C
CH45 15p
LH37
CH48 12p
CH49 1p5
LH07
CH15 68p
LH14
DH09 BA582
RH21 22k
TH02 BF569
RH25 12k
CH20 4p7
CH21 100p
RH29 12R
TH03 BF569R
CH22 3p9
RH27 15R
RH24 3k9
RH28 680R
CH18 4n7
RH30 120R
RH32 680R
RH33 1k8
CH23 1n
RH35 5k6
RH34 120R
CH17 120p
RH38 56R
RH39 10k
RH40 1k
DH12 1T33C
LH17
DH11 1T33C
LH18
RH41 1k8
CH24 150p
LH19
LH23 3u3
CH37 180p
RH37 3k3
CH30 1n
DH15 BA582
RH43 1k8
CH19 4p7
CH29 4p7
CH34 5p6
CH33 1n
MP02
CH35 27p
LH21
LH22
MP01
CH32 27p
RH66 1k
LH38
CH50 1p5
TH05 BF569R
RH63 1k8
CH51 470p
RH58 4R7
RH60 390R
RH61 2k7
RH62 15k
CH52 1n
CH53 2p2
TH06 2SC2736
CH54 3p3
RH64 330R
RH65 220R
CH57 1p
LH39
CH36 1p5
LH40
DH25 1T33C
RH68 2k7
CH55 120p
RH69 12k
RH70 470R
CH58 11p
RH71 10k
CH47 120p
RH75 33k
LH20
CH25 100p
RH42 47R
RH67 10R
RH73 270R
RH72 3k9
TH07 2SC2736
CH61 4n7
RH74 10R
CH64 39p
RH56 10R
TT07 BC857
CH63 10p
LH74
RT23 22k
CT19 1n
CH62 39p
RH53 22k
CT21 100p
RT15 22k
RT25 33k
CT12 10n
RT11 68k
CT14 100n
RT16 180R
CT17 1n
TT03 BC847B
CT13 6p8
CT10 27p
QT01 4MHz
CT09 6p8
CT11 27p
CT15 1n
CT18 100p
IT02 MGP3002
RT09 470R
RT18
RT19 10k
RT21 2k2
RT22 4k7
15k
RT10 4k7
RT06 100R
RT07 470R
RT12 0R0
CT07 10p
CT01 1n
CT20 47n
TT05 BC847B
TT06 BC857
IT01 MGP3002
CM18 5p6
CT02 1n
TT02 BC847B
RT02 5k6
CT16 47n
RT05 15k
CT03 47n
CT04 330n
CT06 1n
RT03 39k
LM04
CM01 47p
CM27 3p3
CM08 47p
RM11 3K9
LM01
CM11 39p
RM14 330R
CM17 1p2
CM16 1p8
CM19 10M
CM20 47n
RM25 560R
CM02 1n
LM05
CM09 15p
DM01 HSM276
RM07 270R
DM03 BB721
CM21 8p2
RM24 560R
RM26 820R
RM16 330R
RM01 390R
TM01 BF771
RM02 15k
CM12 39p
CM13 10p
RM15 10k
TM02 2SC2736
RM18 270R
CM26 47p
RM19 4k7
RM03 2k2
CM05 47p
RM08 100R
RM10 220R
RM12 3K3
CM14 1n
RM13 470k
RM22 3k9
CM23 10p
RM20 270R
CM24 47p
CP10 4n7
CH39 1n
CM04 47p
RM09 22R
CM10 4p7
CM25 4p7
CM15 4n7
RM21 100k
CM22 47p
1A
2A
1
7
8
14
Ant.
COAX2
TV out
COAX1
+Pow 13
AGC 12
U_R 10
Video/ Sound in 9
GND 11
+33V 6
+5V 3
SDA 8
SCL 7
MEM 5
GND 4
+12V 2
IF out 1

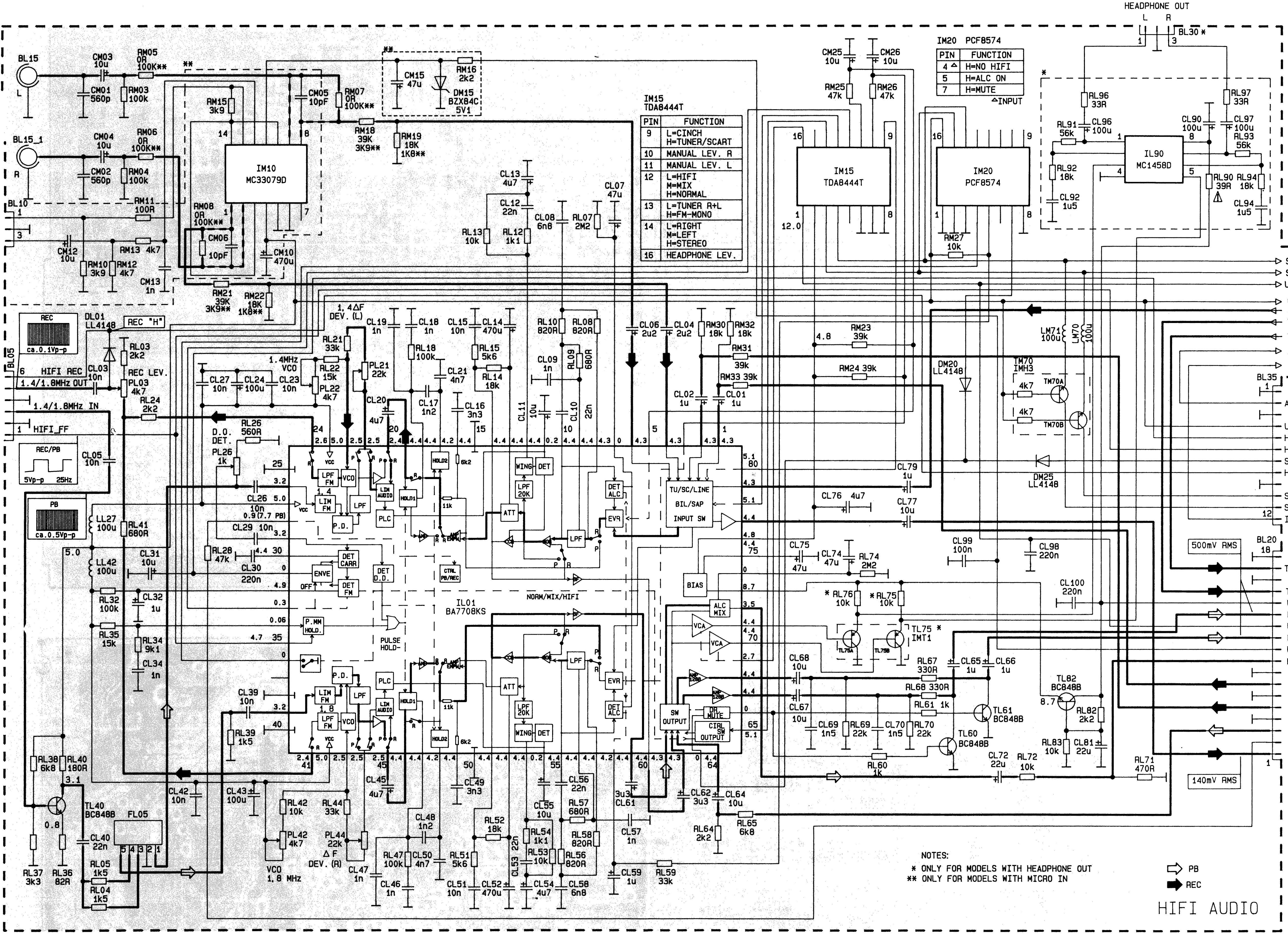
Signalplatte
Signal processing board


SPB R2000 LO
11041950/00

Scartanschlußplatte
Connection board



HiFi-Audio
HiFi audio



HEADPHONE OUT
L R
BL30 *
BL15
L
BL15_1
R
CINCH IN
MICRO IN
BL10
CM03 10u
CM01 560p
CM04 10u
CM02 560p
RM05 0R 100K**
RM03 100k
RM06 0R 100K**
RM04 100k
RM11 100R
RM13 4k7
RM10 3k9
RM12 4k7
CM12 10u
CM13 1n
RM15 3k9
IM10 MC33079D
CM05 10pF
RM07 0R 100K**
RM08 0R 100K**
CM06 10pF
CM10 470u
RM21 39K 3K9**
RM22 18K 1K8**
RM18 39K 3K9**
RM19 18K 1K8**
CM15 47u
RM16 2k2
DM15 BZX84C 5V1
CM25 10u
CM26 10u
RM25 47k
RM26 47k
IM15 TDA8444T
IM20 PCF8574
RM27 10k
IL90 MC1458D
RL96 33R
RL97 33R
RL91 56k
CL96 100u
CL90 100u
CL97 100u
RL93 56k
RL92 18k
RL90 39R
RL94 18k
CL92 1u5
CL94 1u5
SCL
SDA
U4_+12VSTBY
U2_+5V
MONO-OUT
TUNER_L
TUNER_R
AM_TON
IM_IDENT
BL35
HIFI_ENV
HIFI_FF
SERVO_MUTE
HIFI_REC_ON
TO SIGNAL BOARD BW21
BL20
500mV RMS
U1_+12V
LINEOU.R
LINEOU.L
U5_-25V
MOD-OUT
IN.SEL.R
IN_SEL.L
NORM_PB
UPB_12V
NORM_REC
TO CONNECTION BOARD BW30
140mV RMS
REC
DL01 LL4148
REC "H"
RL03 2k2
CL03 10n
REC LEV.
PL03 4k7
RL24 2k2
ca.0.1Vp-p
HIFI REC
1.4/1.8MHz OUT
1.4/1.8MHz IN
HIFI_FF
TO HEAD AMPLIFIER B004
BL05
REC/PB
5Vp-p 25Hz
CL05 10n
PB
ca.0.5Vp-p
LL27 100u
RL41 680R
LL42 100u
CL31 10u
RL32 100k
CL32 1u
RL35 15k
RL34 9k1
CL34 1n
CL39 10n
RL39 1k5
RL38 6k8
RL40 180R
TL40 BC848B
FL05
CL40 22n
RL05 1k5
RL04 1k5
RL37 3k3
RL36 82R
CL42 10n
CL43 100u
RL42 10k
PL42 4k7
RL44 33k
PL44 22k
ΔF DEV. (R)
VCO 1.8 MHz
CL47 1n
CL45 4u7
CL46 1n
RL47 100k
CL50 4n7
CL48 1n2
RL51 5k6
CL51 10n
CL52 470u
CL49 3n3
RL52 18k
CL53 22n
CL54 4u7
RL54 1k1
RL53 10k
CL55 10u
CL56 22n
RL57 680R
RL58 820R
RL56 820R
CL58 6n8
CL57 1n
CL59 1u
RL59 33k
CL61 3u3
CL62 3u3
CL64 10u
RL64 2k2
RL65 6k8
IL01 BA7708KS
1.4ΔF DEV. (L)
RL21 33k
RL22 15k
PL21 22k
PL22 4k7
1.4MHz VCO
CL27 10n
CL24 100u
CL23 10n
CL19 1n
CL18 1n
CL15 10n
CL14 470u
RL18 100k
RL15 5k6
RL14 18k
CL21 4n7
CL20 4u7
CL17 1n2
CL16 3n3
RL26 560R
D.O. DET.
PL26 1k
CL26 10n
CL29 10n
RL28 47k
CL30 220n
CL13 4u7
CL12 22n
RL13 10k
RL12 1k1
CL08 6n8
RL07 2M2
CL07 47u
RL10 820R
RL08 820R
CL09 1n
RL09 680R
CL11 10u
CL10 22n
CL06 2u2
CL04 2u2
RM30 18k
RM32 18k
RM31 39k
RM33 39k
CL02 1u
CL01 1u
RM23 39k
RM24 39k
DM20 LL4148
LM71 100u
LM70 100u
TM70 IMH3
TM70A
TM70B
DM25 LL4148
CL79 1u
CL76 4u7
CL77 10u
CL75 47u
CL74 47u
RL74 2M2
CL99 100n
CL98 220n
CL100 220n
RL76 10k
RL75 10k
TL75 * IMT1
TL75A
TL75B
CL68 10u
CL67 10u
RL67 330R
RL68 330R
CL65 1u
CL66 1u
RL61 1k
TL61 BC848B
TL60 BC848B
RL69 22k
CL69 1n5
CL70 1n5
RL70 22k
RL60 1k
CL72 22u
RL72 10k
TL82 BC848B
RL82 2k2
RL83 10k
CL81 22u
RL71 470R
LPF FM
VCO
LIM FM
P.D.
LPF
PLC
LIM AUDIO
HOLD1
HOLD2
6k2
11k
WING
DET
LPF 20K
ATT
DET ALC
EVR
TU/SC/LINE BIL/SAP INPUT SW
DET CARR
ENVE
DET FM
DET D.O.
CTRL PB/REC
NORM/MIX/HIFI
P.MM HOLD.
PULSE HOLD
BIAS
ALC MIX
VCA
SW OUTPUT
DR MUTE
CIRL SW OUTPUT
PB
REC
HIFI AUDIO

IM15 TDA8444T

PIN	FUNCTION
9	L=CINCH H=TUNER/SCART
10	MANUAL LEV. R
11	MANUAL LEV. L
12	L=HIFI M=MIX H=NORMAL
13	L=TUNER R+L H=FM-MONO
14	L=RIGHT M=LEFT H=STEREO
16	HEADPHONE LEV.

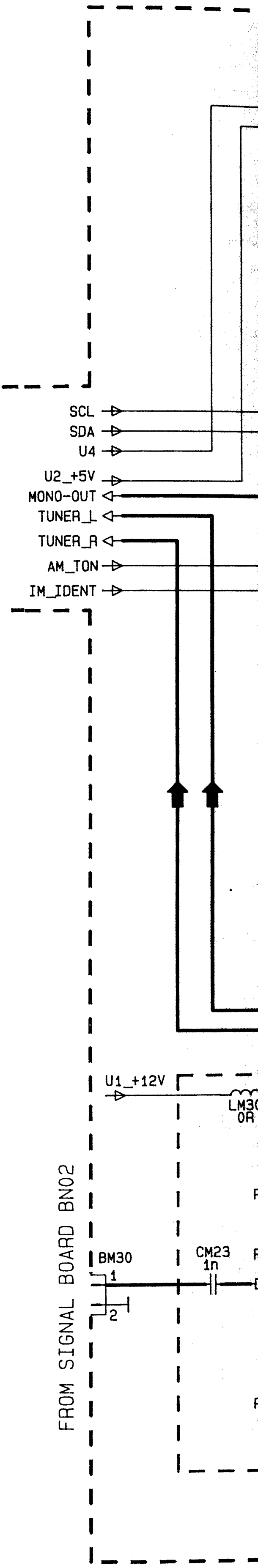
IM20 PCF8574

PIN	FUNCTION
4 △	H=NO HIFI
5	H=ALC ON
7	H=MUTE

△INPUT

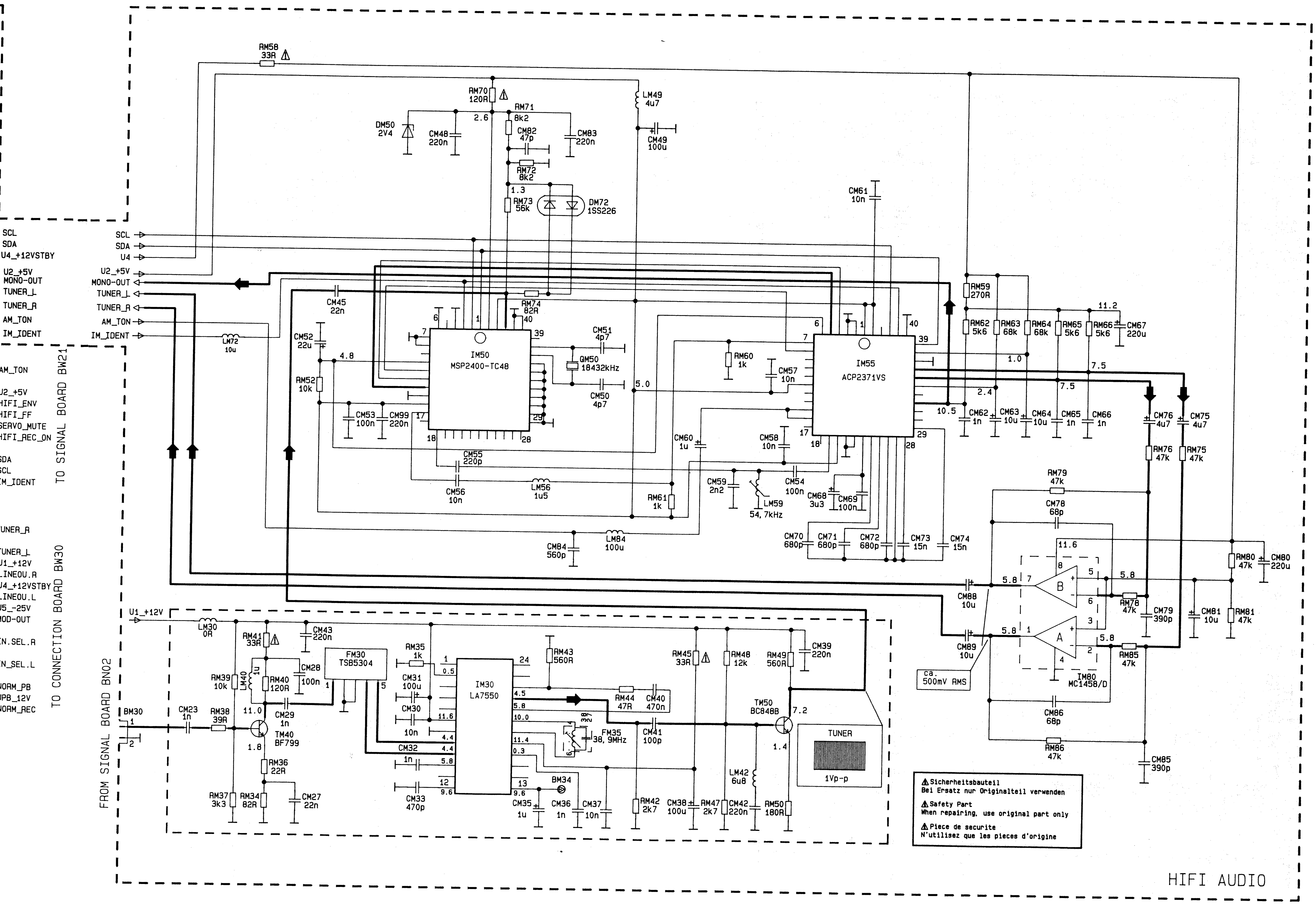
NOTES:
* ONLY FOR MODELS WITH HEADPHONE OUT
** ONLY FOR MODELS WITH MICRO IN

HiFi-Audio (FM
HiFi audio (FM



SCL
SDA
U4
U2_+5V
MONO-OUT
TUNER_L
TUNER_R
AM_TON
IM_IDENT
U1_+12V
LM30 0R
BM30
CM23 1n
FROM SIGNAL BOARD BN02

HiFi-Audio (FM und NICAM)
HiFi audio (FM and NICAM)

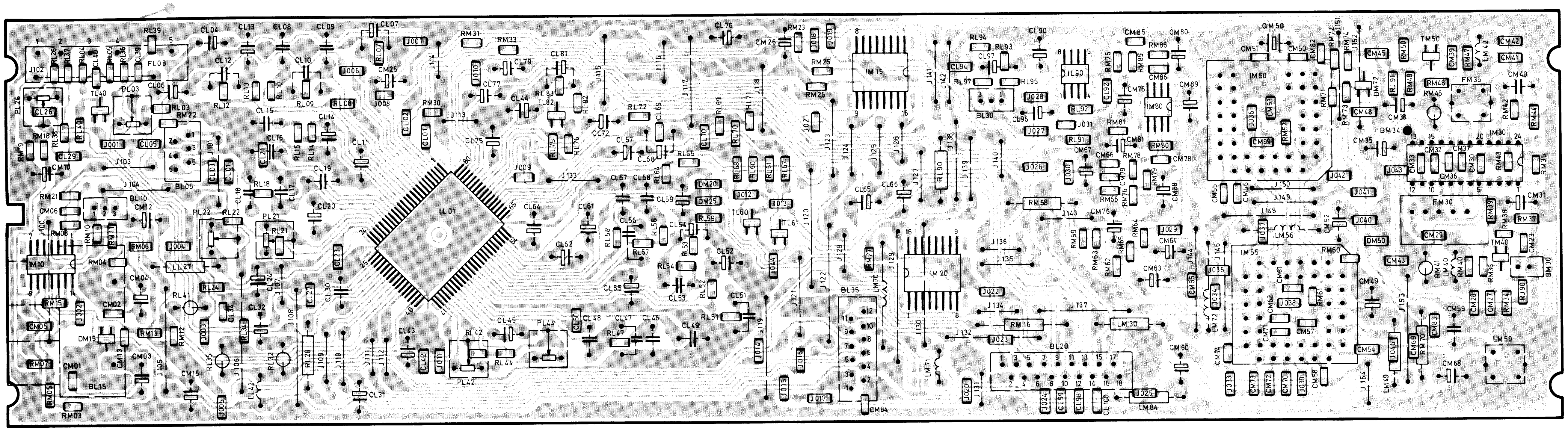

SCL
SDA
U4_+12VSTBY
U2_+5V
MONO-OUT
TUNER_L
TUNER_R
AM_TON
IM_IDENT
AM_TON
U2_+5V
HIFI_ENV
HIFI_FF
SERVO_MUTE
HIFI_REC_ON
SDA
SCL
IM_IDENT
TO SIGNAL BOARD BW21
TUNER_R
TUNER_L
U1_+12V
LINEOU.R
U4_+12VSTBY
LINEOU.L
U5_-25V
MOD-OUT
EN.SEL.R
EN_SEL.L
NORM_PB
UPB_12V
NORM_REC
TO CONNECTION BOARD BW30
FROM SIGNAL BOARD BN02
RM58 33R
RM70 120R
RM71 8k2
DM50 2V4
CM48 220n
CM82 47p
CM83 220n
RM72 8k2
RM73 56k
DM72 1SS226
LM49 4u7
CM49 100u
CM61 10n
CM45 22n
RM74 82R
CM52 22u
RM52 10k
CM53 100n
CM99 220n
IM50 MSP2400-TC48
CM51 4p7
QM50 18432kHz
CM50 4p7
CM55 220p
CM56 10n
LM56 1u5
LM72 10u
RM60 1k
CM57 10n
IM55 ACP2371VS
CM60 1u
CM58 10n
RM61 1k
CM59 2n2
LM59 54,7kHz
CM54 100n
CM68 3u3
CM69 100n
CM84 560p
LM84 100u
CM70 680p
CM71 680p
CM72 680p
CM73 15n
CM74 15n
RM59 270R
RM62 5k6
RM63 68k
RM64 68k
RM65 5k6
RM66 5k6
CM67 220u
CM62 1n
CM63 10u
CM64 10u
CM65 1n
CM66 1n
CM76 4u7
CM75 4u7
RM76 47k
RM75 47k
RM79 47k
CM78 68p
RM80 47k
CM80 220u
CM88 10u
CM89 10u
RM78 47k
CM79 390p
CM81 10u
RM81 47k
RM85 47k
IM80 MC1458/D
ca. 500mV RMS
CM86 68p
RM86 47k
CM85 390p
U1_+12V
LM30 0R
RM41 33R
CM43 220n
FM30 TSB5304
RM35 1k
IM30 LA7550
RM43 560R
RM45 33R
RM48 12k
RM49 560R
CM39 220n
RM39 10k
LM40 1u
RM40 120R
CM28 100n
CM31 100u
CM30 10n
BM30
CM23 1n
RM38 39R
CM29 1n
TM40 BF799
RM44 47R
CM40 470n
TM50 BC848B
FM35 38,9MHz
CM41 100p
TUNER
1Vp-p
RM36 22R
CM32 1n
RM37 3k3
RM34 82R
CM27 22n
CM33 470p
BM34
CM35 1u
CM36 1n
CM37 10n
RM42 2k7
CM38 100u
RM47 2k7
LM42 6u8
CM42 220n
RM50 180R
HIFI AUDIO

⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden

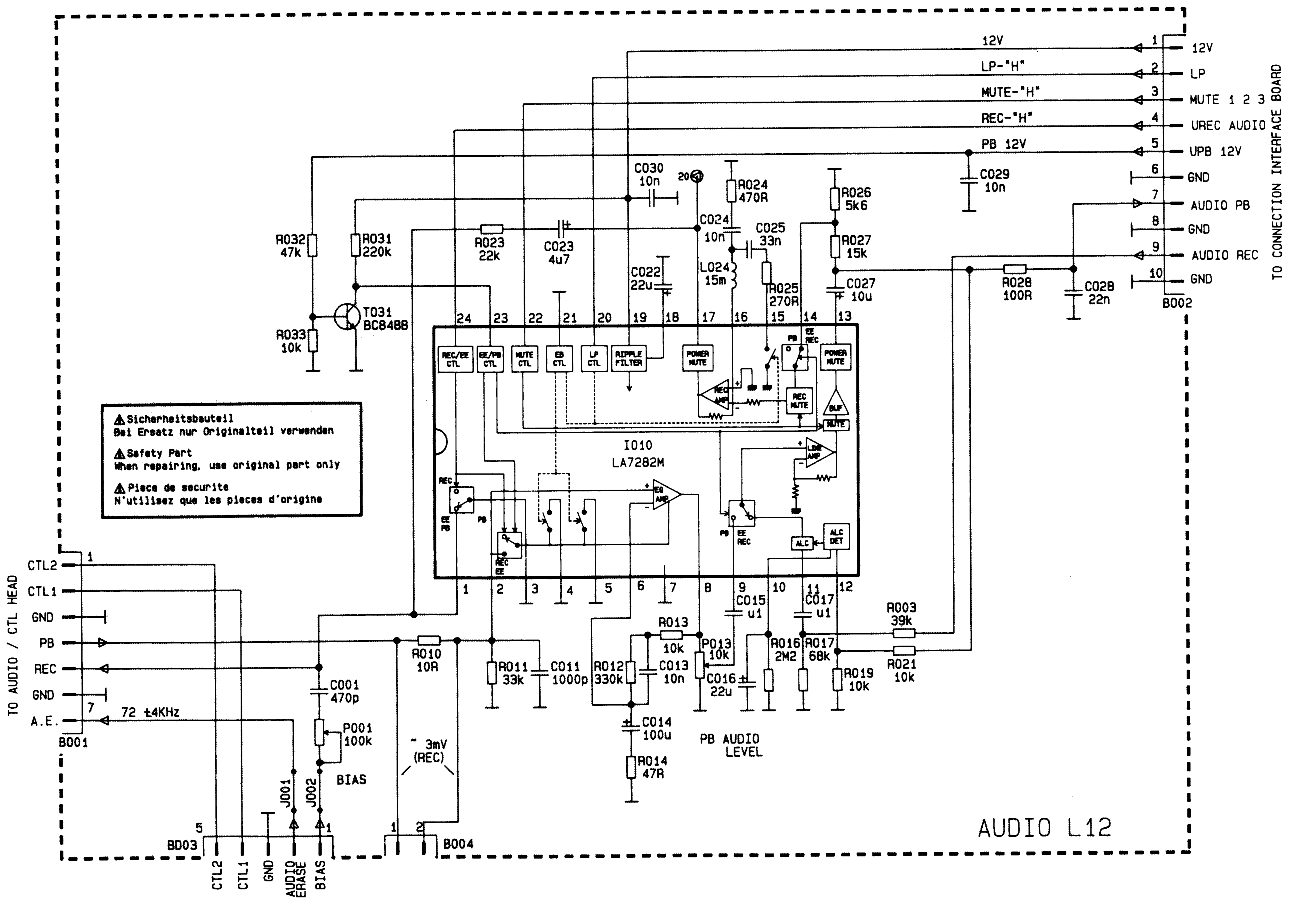
⚠ Safety Part
When repairing, use original part only

⚠ Piece de securite
N'utilisez que les pieces d'origine

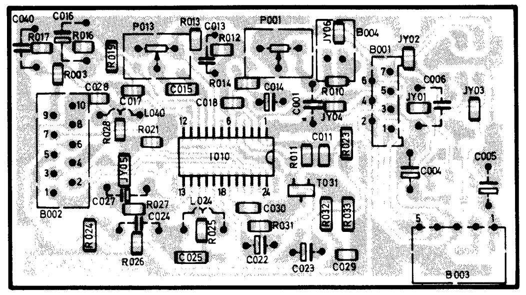
HiFi-Audioplatte · HiFi audio board



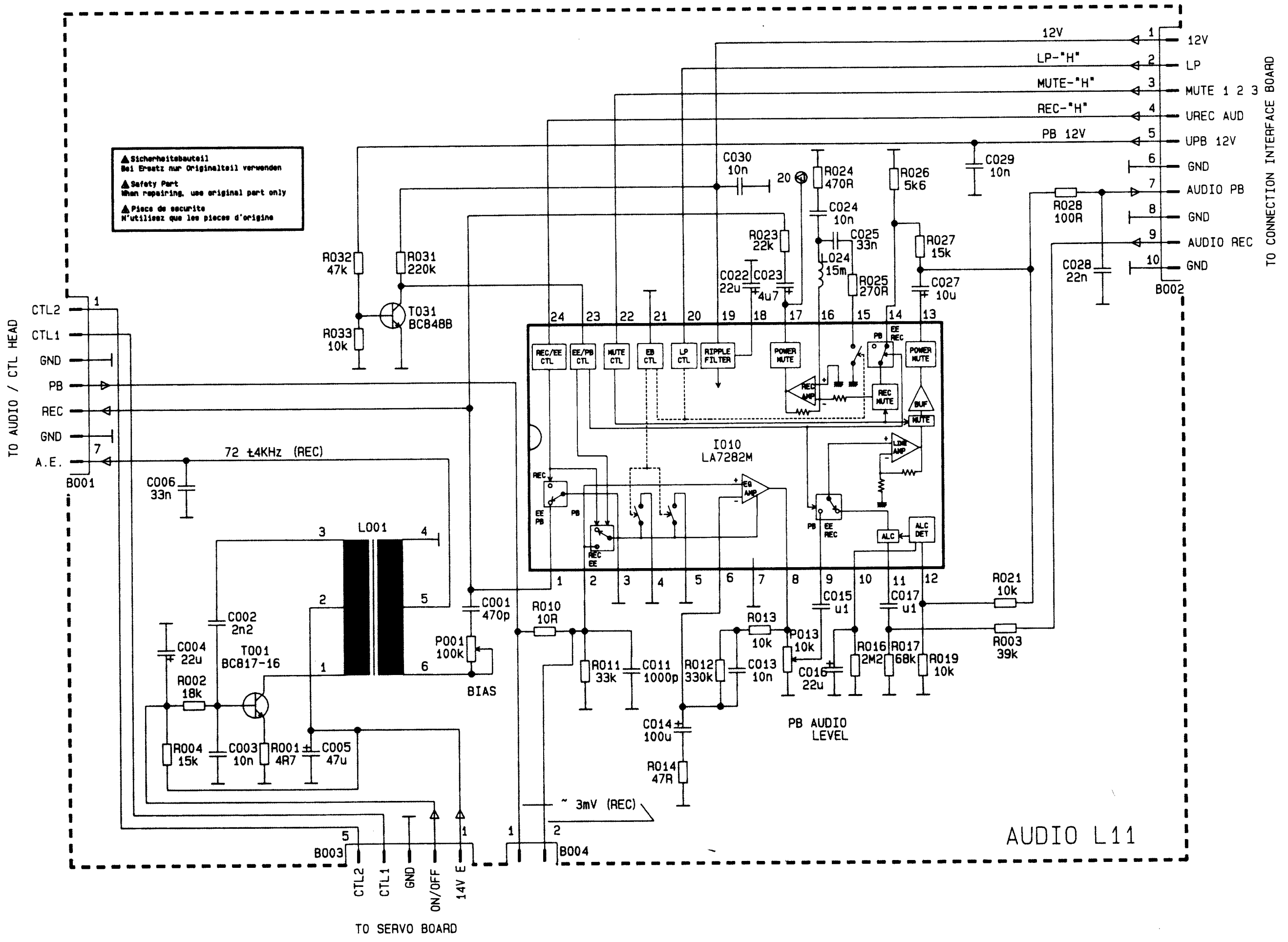
Audio · Audio


12V
LP-"H"
MUTE-"H"
REC-"H"
PB 12V
12V
LP
MUTE 1 2 3
UREC AUDIO
UPB 12V
GND
AUDIO PB
GND
AUDIO REC
GND
TO CONNECTION INTERFACE BOARD
B002
I010
LA7282M
⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden
⚠ Safety Part
When repairing, use original part only
⚠ Piece de securite
N'utilisez que les pieces d'origine
CTL2
CTL1
GND
PB
REC
GND
A.E.
B001
TO AUDIO / CTL HEAD
72 ±4KHz
BIAS
3mV (REC)
PB AUDIO LEVEL
AUDIO L12
B003
B004
CTL2
CTL1
GND
AUDIO ERASE
BIAS
TO SERVO BOARD

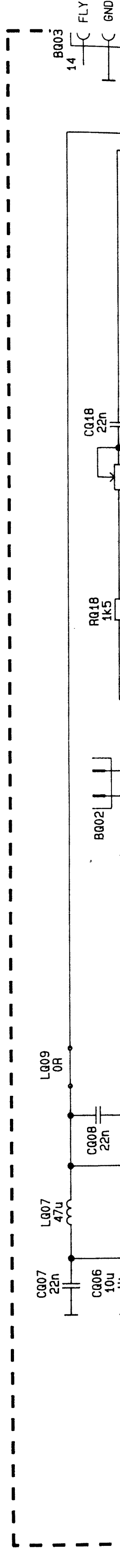
Audioplatte
Audio board

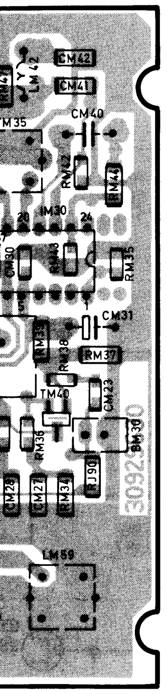


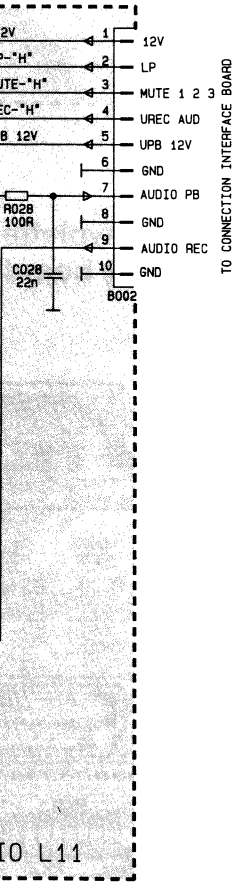
Audio – mit Dubbing
Audio – with dubbing


12V
LP-"H"
MUTE-"H"
REC-"H"
PB 12V
12V
LP
MUTE 1 2 3
UREC AUD
UPB 12V
GND
AUDIO PB
GND
AUDIO REC
GND
TO CONNECTION INTERFACE BOARD
B002
⚠ Sicherheitsbauteil
Bei Ersatz nur Originalteil verwenden
⚠ Safety Part
When repairing, use original part only
⚠ Piece de securite
N'utilisez que les pieces d'origine
I010
LA7282M
CTL2
CTL1
GND
PB
REC
GND
A.E.
B001
TO AUDIO / CTL HEAD
72 ±4KHz (REC)
L001
T001
BC817-16
BIAS
PB AUDIO LEVEL
3mV (REC)
AUDIO L11
B003
B004
CTL2
CTL1
GND
ON/OFF
14V E
TO SERVO BOARD

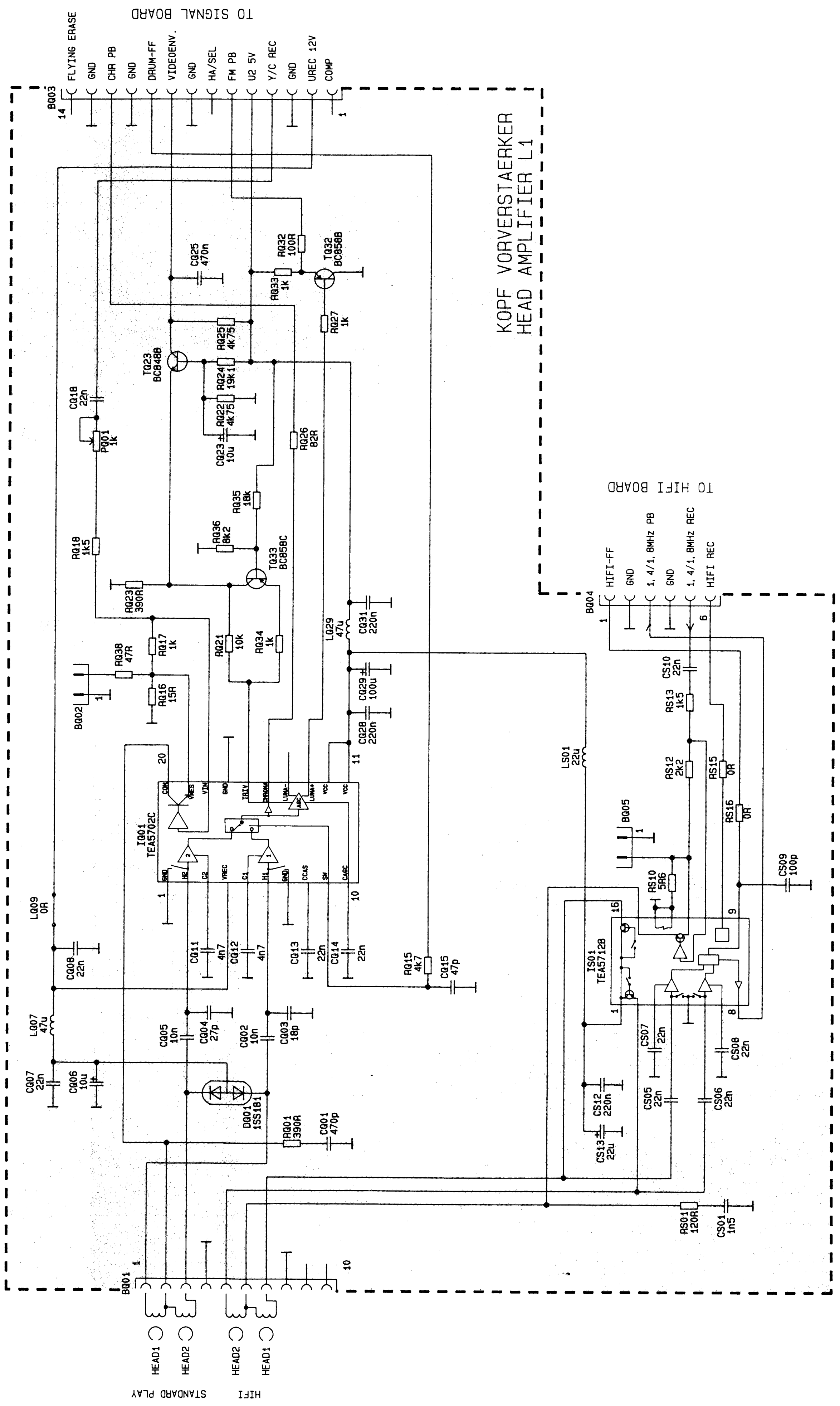
Kopfvor
Head am


FLYING ERASE
GND
B003

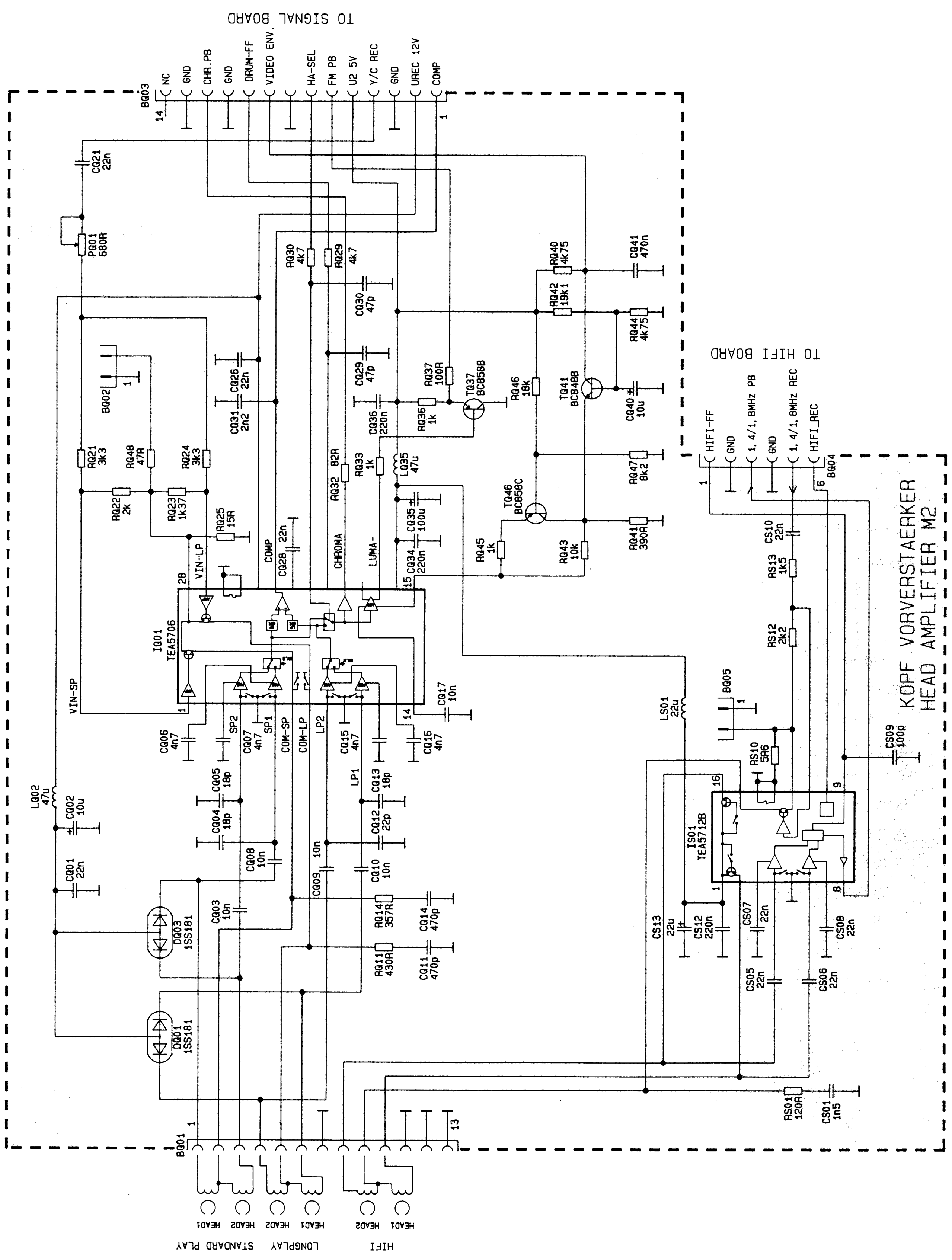

CM42
CM41
CM40
CM35
CM30
CM31
RM37
RM35
LM59
3092


12V
LP
MUTE 1 2 3
UREC AUD
UPB 12V
GND
AUDIO PB
GND
AUDIO REC
GND
RQ28 100R
CQ28 22n
BQ02
TO CONNECTION INTERFACE BOARD
IO L11

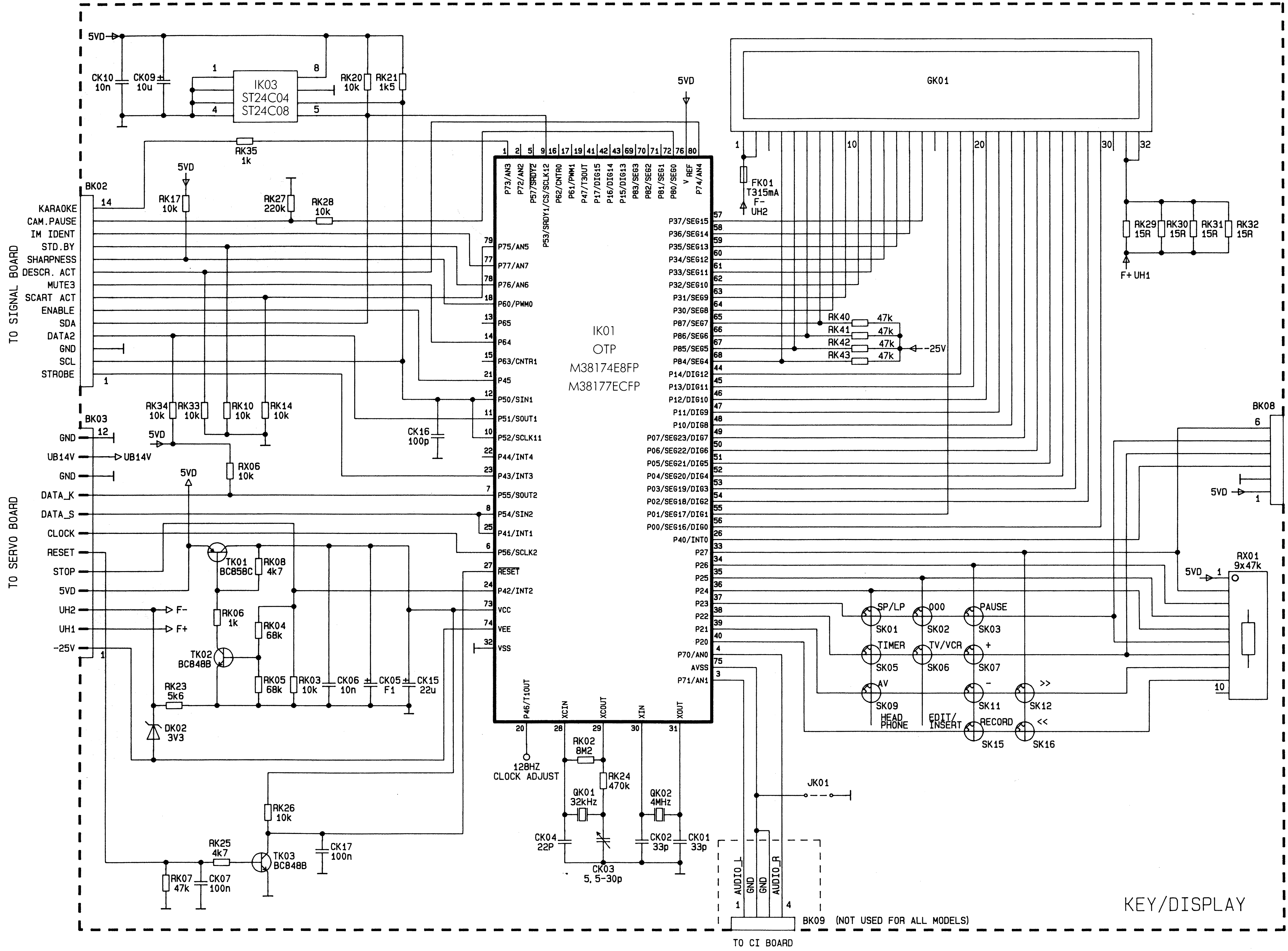
Kopfvorverstärker (2 + 2 HiFi-Köpfe)
Head amplifier (2 + 2 HiFi heads)


TO SIGNAL BOARD
FLYING ERASE
GND
CHR PB
GND
DRUM-FF
VIDEOENV.
GND
HA/SEL
FM PB
U2 5V
Y/C REC
GND
UREC 12V
COMP
BQ03
KOPF VORVERSTAERKER
HEAD AMPLIFIER L1
TO HIFI BOARD
HIFI-FF
GND
1.4/1.8MHz PB
GND
1.4/1.8MHz REC
HIFI REC
BQ04
IQ01 TEA5702C
IS01 TEA5712B
TQ23 BC848B
TQ32 BC858B
TQ33 BC858C
DQ01 1SS181
BQ01
BQ02
BQ05
HEAD1
HEAD2
HEAD2
HEAD1
STANDARD PLAY
HIFI

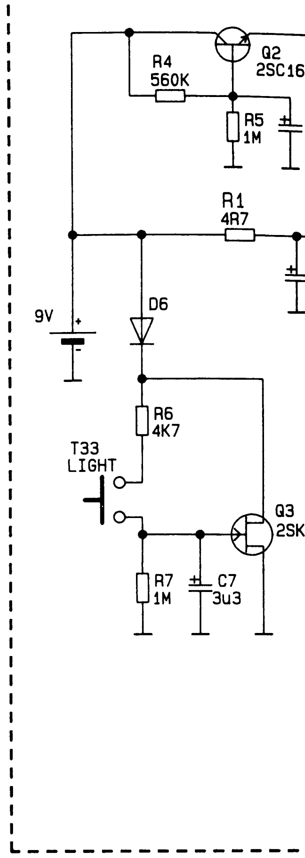
Kopfvorverstärker (4 + 2 HiFi-Köpfe)
Head amplifier (4 + 2 HiFi heads)


TO SIGNAL BOARD
NC
GND
CHR.PB
GND
DRUM-FF
VIDEO ENV.
GND
HA-SEL
FM PB
U2 5V
Y/C REC
GND
UREC 12V
COMP
BQ03
TO HIFI BOARD
HIFI-FF
GND
1.4/1.8MHz PB
GND
1.4/1.8MHz REC
HIFI_REC
BQ04
KOPF VORVERSTAERKER
HEAD AMPLIFIER M2
IQ01 TEA5706
IS01 TEA5712B
TQ37 BC858B
TQ44 BC848B
TQ46 BC858C
DQ01 1SS181
DQ03 1SS181
VIN-SP
VIN-LP
COMP
CHROMA
LUMA-
BQ01
BQ02
BQ05
HEAD1
HEAD2
HEAD2
HEAD1
HEAD2
HEAD1
STANDARD PLAY
LONGPLAY
HIFI

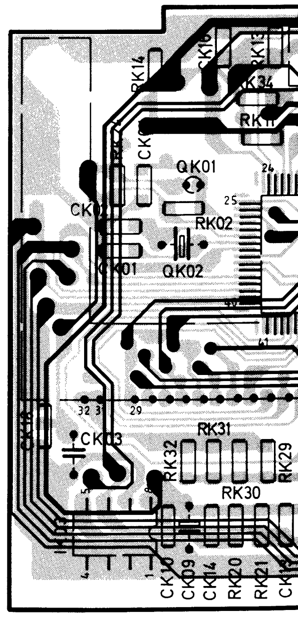
Key/Display
Key/Display


5VD
CK10 10n
CK09 10u
IK03 ST24C04 ST24C08
RK20 10k
RK21 1k5
RK35 1k
RK17 10k
RK27 220k
RK28 10k
BK02
TO SIGNAL BOARD
KARAOKE
CAM.PAUSE
IM IDENT
STD.BY
SHARPNESS
DESCR. ACT
MUTE3
SCART ACT
ENABLE
SDA
DATA2
GND
SCL
STROBE
RK34 10k
RK33 10k
RK10 10k
RK14 10k
BK03
TO SERVO BOARD
GND
UB14V
GND
DATA_K
DATA_S
CLOCK
RESET
STOP
5VD
UH2
UH1
-25V
RX06 10k
CK16 100p
TK01 BC858C
RK08 4k7
RK06 1k
RK04 68k
TK02 BC848B
RK05 68k
RK03 10k
CK06 10n
CK05 F1
CK15 22u
RK23 5k6
DK02 3V3
F-
F+
RK26 10k
RK25 4k7
TK03 BC848B
CK17 100n
RK07 47k
CK07 100n
IK01 OTP M38174E8FP M38177ECFP
P73/AN3
P72/AN2
P57/SRDY2
P53/SRDY1/CS/SCLK12
P62/CNTR0
P61/PWM1
P47/T3OUT
P17/DIG15
P16/DIG14
P15/DIG13
P83/SEG3
P82/SEG2
P81/SEG1
P80/SEG0
VREF
P74/AN4
P75/AN5
P77/AN7
P76/AN6
P60/PWM0
P65
P64
P63/CNTR1
P45
P50/SIN1
P51/SOUT1
P52/SCLK11
P44/INT4
P43/INT3
P55/SOUT2
P54/SIN2
P41/INT1
P56/SCLK2
RESET
P42/INT2
VCC
VEE
VSS
P37/SEG15
P36/SEG14
P35/SEG13
P34/SEG12
P33/SEG11
P32/SEG10
P31/SEG9
P30/SEG8
P87/SEG7
P86/SEG6
P85/SEG5
P84/SEG4
P14/DIG12
P13/DIG11
P12/DIG10
P11/DIG9
P10/DIG8
P07/SEG23/DIG7
P06/SEG22/DIG6
P05/SEG21/DIG5
P04/SEG20/DIG4
P03/SEG19/DIG3
P02/SEG18/DIG2
P01/SEG17/DIG1
P00/SEG16/DIG0
P40/INT0
P27
P26
P25
P24
P23
P22
P21
P20
P70/AN0
AVSS
P71/AN1
P46/T1OUT
XCIN
XCOUT
XIN
XOUT
128HZ CLOCK ADJUST
RK02 8M2
RK24 470k
QK01 32kHz
QK02 4MHz
CK04 22P
CK03 5,5-30p
CK02 33p
CK01 33p
GK01
FK01 T315mA
UH2
RK29 15R
RK30 15R
RK31 15R
RK32 15R
F+ UH1
RK40 47k
RK41 47k
RK42 47k
RK43 47k
-25V
BK08
TO FCB
SK/COM
SK04
SK08
IR
GND
5VD
RX01 9x47k
SP/LP
SK01
000
SK02
PAUSE
SK03
TIMER
SK05
TV/VCR
SK06
+
SK07
AV
SK09
HEAD PHONE
EDIT/ INSERT
-
SK11
>>
SK12
RECORD
SK15
<<
SK16
JK01
AUDIO_L
GND
GND
AUDIO_R
BK09 (NOT USED FOR ALL MODELS)
TO CI BOARD
KEY/DISPLAY

Fernbedienung
Remote control

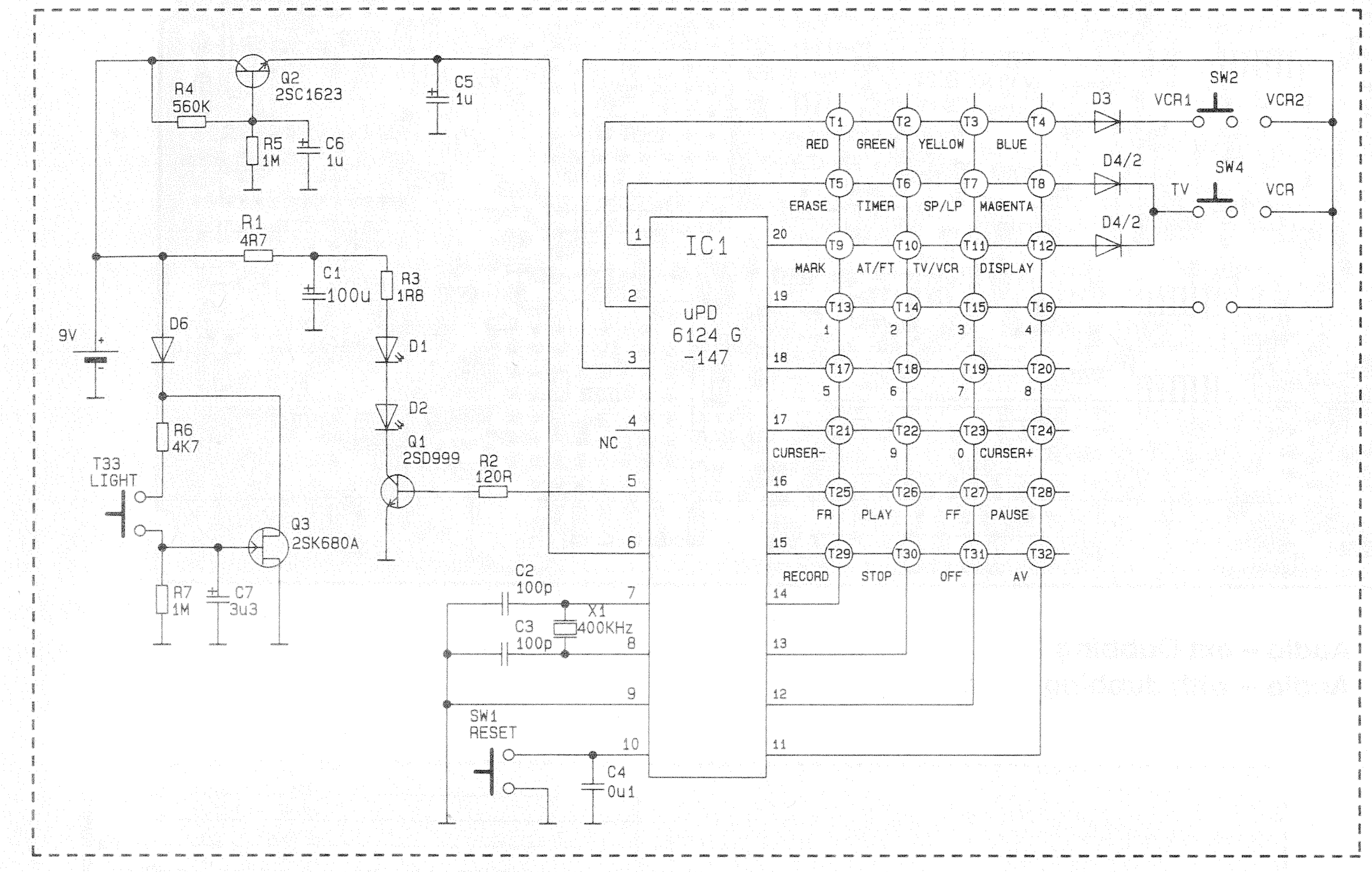

R4 560K
Q2 2SC16
R5 1M
R1 4R7
9V
D6
R6 4K7
T33 LIGHT
Q3 2SK
R7 1M
C7 3u3

Key-/Displayplatte
Key/Display board

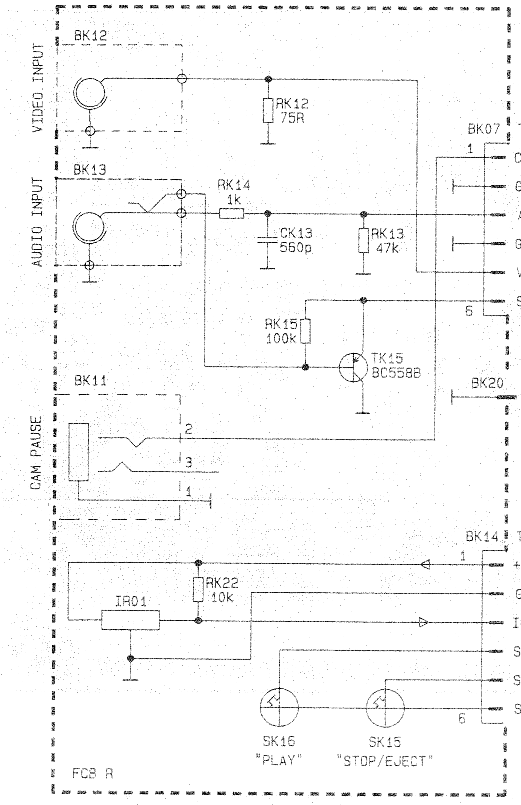

RK14
RK34
QK01
RK02
QK02
RK31
RK32
RK30
RK29
CK09
CK14
RK20
RK21

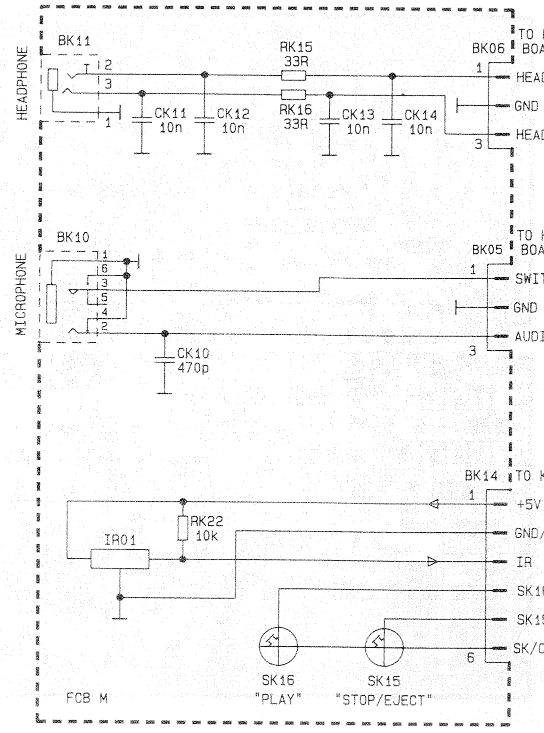
TO FCB
SK/COM
SK04
SK08
IR
GND
5VD

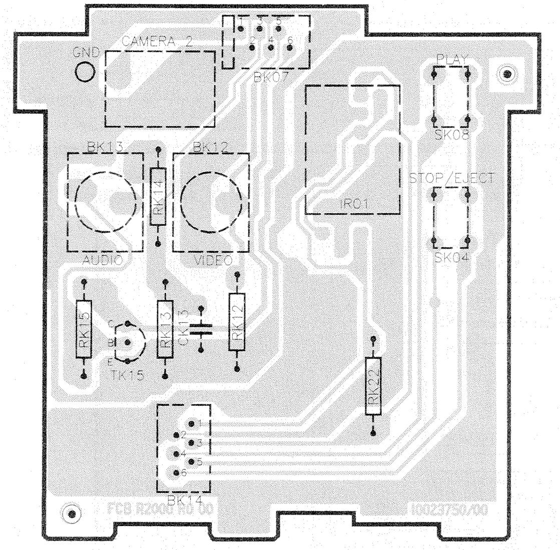
Fernbedienung
Remote control

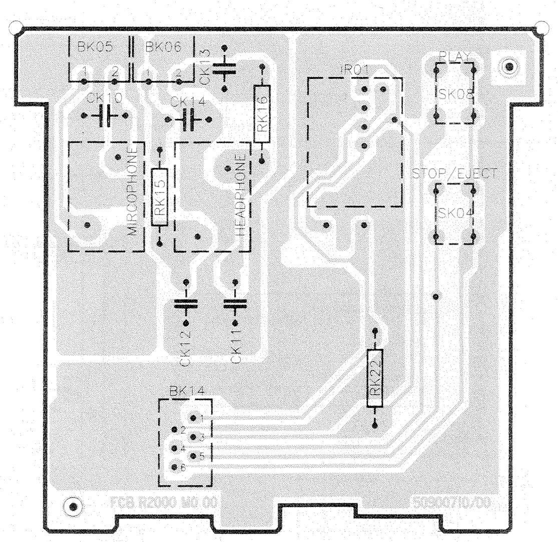

R4
560K
Q2
2SC1623
C5
1u
R5
1M
C6
1u
R1
4R7
C1
100u
R3
1R8
9V
D6
D1
D2
Q1
2SD999
R2
120R
R6
4K7
T33
LIGHT
Q3
2SK680A
R7
1M
C7
3u3
C2
100p
X1
400KHz
C3
100p
SW1
RESET
C4
0u1
IC1
uPD
6124 G
-147
NC
RED
GREEN
YELLOW
BLUE
ERASE
TIMER
SP/LP
MAGENTA
MARK
AT/FT
TV/VCR
DISPLAY
CURSER-
CURSER+
FR
PLAY
FF
PAUSE
RECORD
STOP
OFF
AV
D3
D4/2
SW2
SW4
VCR1
VCR2
TV
VCR

Anschlußbuchsen
Front connection

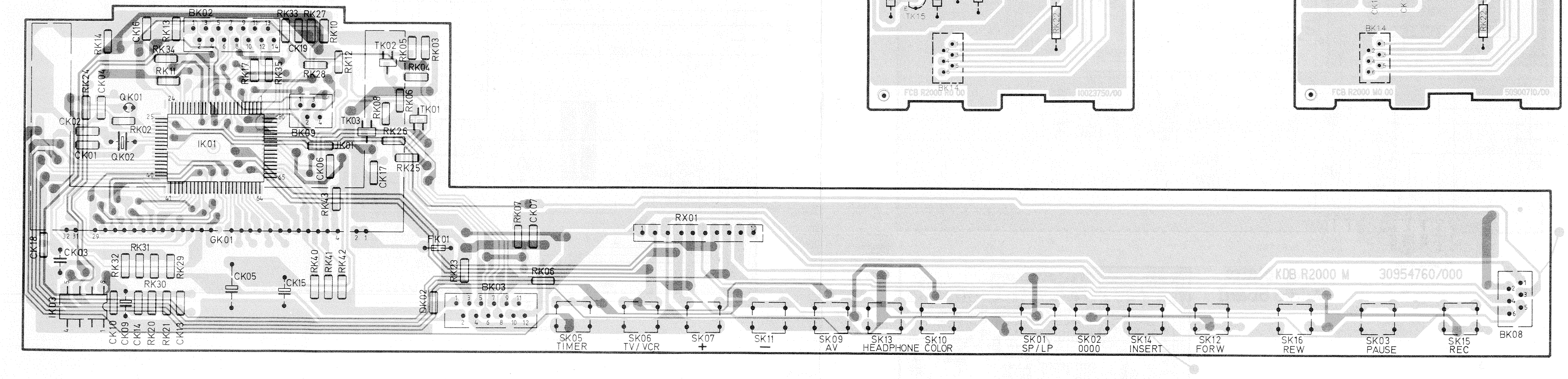

VIDEO INPUT
AUDIO INPUT
CAM PAUSE
BK12
BK13
BK11
RK12
75R
RK14
1k
CK13
560p
RK13
47k
RK15
100k
TK15
BC558B
BK07
TO CIB
CAM PAUSE
GND
AUDIO_R
GND
VIDEO
SWITCH
BK20
BK14
TO KDB
+5V
GND/KDB
IR
SK16
SK15
SK/COM
IR01
RK22
10k
SK16
"PLAY"
SK15
"STOP/EJECT"
FCB R


HEADPHONE
MICROPHONE
BK11
BK10
RK15
33R
RK16
33R
CK11
10n
CK12
10n
CK13
10n
CK14
10n
CK10
470p
BK06
TO HIFI BOARD
HEAD/L
GND
HEAD/R
BK05
TO HIFI BOARD
SWITCH
GND
AUDIO
BK14
TO KDB
+5V
GND/KDB
IR
SK16
SK15
SK/COM
IR01
RK22
10k
SK16
"PLAY"
SK15
"STOP/EJECT"
FCB M

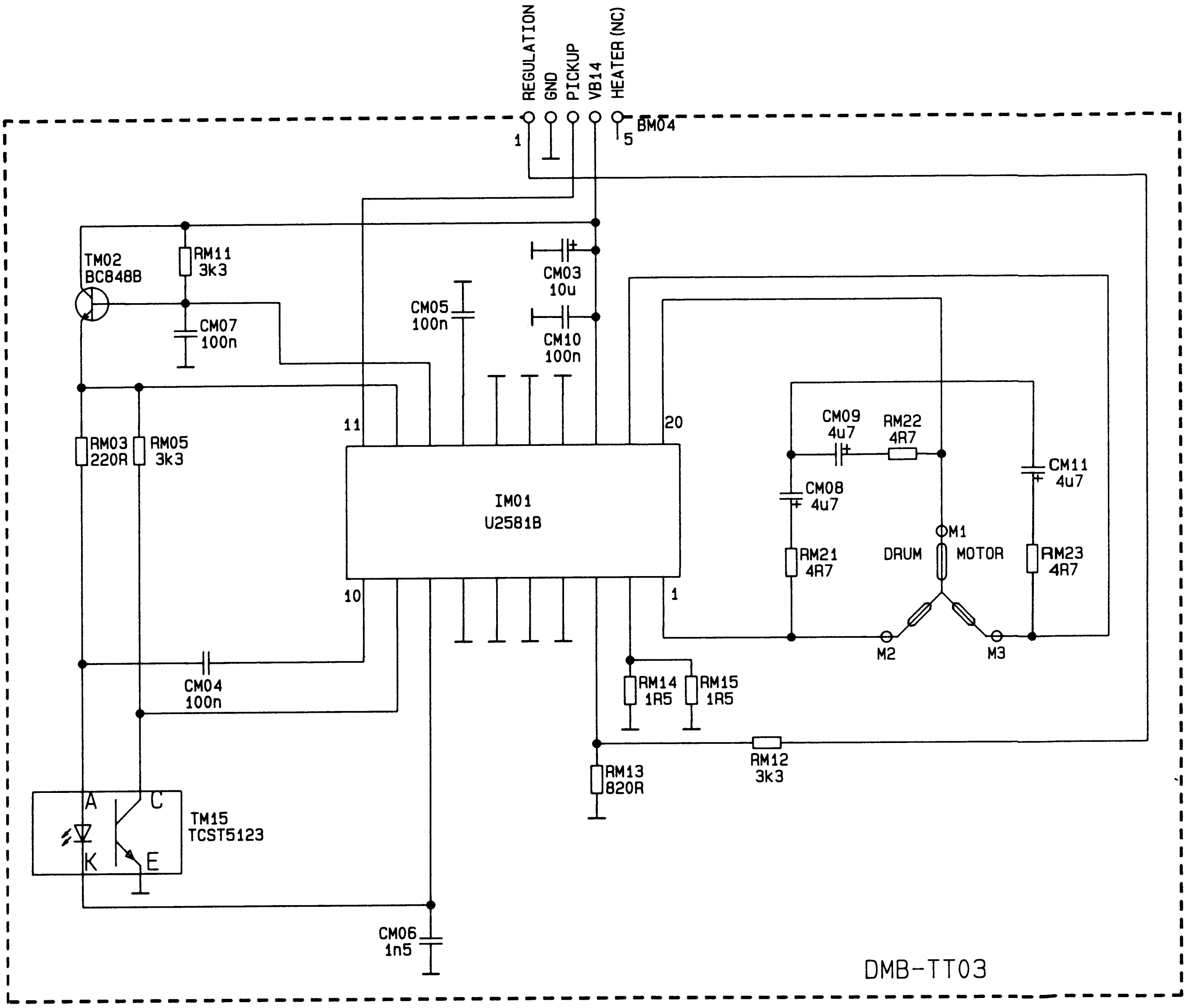

GND
CAMERA_2
BK07
PLAY
SK08
STOP/EJECT
SK04
IR01
BK13
BK12
AUDIO
VIDEO
RK14
RK15
TK15
CK13
RK12
RK22
BK14
FCB R2000 R0 00
10023750/00


BK05
BK06
CK10
CK14
CK13
RK16
IR01
MICROPHONE
RK15
HEADPHONE
STOP/EJECT
SK03
CK12
CK11
RK22
BK14
FCB R2000 M0 00
50900710/00

Key-/Displayplatte
Key/Display board


BK02
RK33
RK27
RK10
RK14
CK16
RK13
RK34
CK19
RK11
RK47
RK35
RK28
RK12
TK02
RK05
RK03
RK04
RK24
CK04
QK01
RK08
RK06
TK01
CK02
RK02
IK01
BK09
TK03
RK26
CK01
QK02
CK06
JK01
CK17
RK25
RK43
RK07
CK07
RX01
CK18
GK01
FK01
CK03
RK31
RK32
RK30
RK29
CK05
CK15
RK40
RK41
RK42
RK23
BK03
RK06
IK03
BK02
CK10
CK09
CK14
RK20
RK21
CK13
KDB R2000 M
30954760/000
SK05
TIMER
SK06
TV/VCR
SK07
+
SK11
—
SK09
AV
SK13
HEADPHONE
SK10
COLOR
SK01
SP/LP
SK02
0000
SK14
INSERT
SK12
FORW
SK16
REW
SK03
PAUSE
SK15
REC
BK08

Kopftrommelmotor
Drum motor


REGULATION
GND
PICKUP
VB14
HEATER (NC)
1
5
BM04
TM02
BC848B
RM11
3k3
CM07
100n
CM03
10u
CM05
100n
CM10
100n
11
20
RM03
220R
RM05
3k3
IM01
U2581B
CM09
4u7
RM22
4R7
CM11
4u7
CM08
4u7
M1
DRUM
MOTOR
RM21
4R7
RM23
4R7
10
1
M2
M3
CM04
100n
RM14
1R5
RM15
1R5
RM13
820R
RM12
3k3
A
C
K
E
TM15
TCST5123
CM06
1n5
DMB-TT03